EXAMINATION OF ALTERNATIVES AND DECISION MAKING CRITERIA FOR MANAGING MARGINALLY ADEQUATE NAVY HOUSING ASSETS

Carl DeForest Greene

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THESIS

EXAMINATION OF ALTERNATIVES AND
DECISION MAKING CRITERIA FOR MANAGING
MARGINALLY ADEQUATE NAVY HOUSING ASSETS

by

Carl DeForest Greene
and
Ernest Theodore Taylor

Thesis Advisor: J. F. Schumann

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Examination of Alternatives and Decision Making Criteria for Managing Marginally Adequate Navy Housing Assets

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I. INTRODUCTION

A. IMPORTANCE OF HOUSING

In 1949, the Congress established a national housing goal of "a decent home and a suitable living environment for every American family."[1] For the United States' military serviceman, this goal is just as major a concern as for his civilian counterpart. This concern was the subject of a statement made by former Secretary of Defense McNamara on 3 October, 1963 while testifying before the Senate Armed Services Committee:

> For the military family man, as for any family man, decent housing for his wife and children is a matter of major concern. While a military man, in keeping with his profession, must be willing to accept personal hardships, I don't think the nation has the right to expect the same from his family. The necessary rigors inherent in the military life are hard enough on a family man without adding the burden of persistent personal hardships for his family. 2

More recently, former Secretary Laird, in a final report covering his four year tenure as Secretary of Defense (January 1969 to January 1973), commented on the expanded importance of decent housing for military personnel due to the newly executed All Volunteer Service concept:

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[1] United States Statutes At Large, 81st Congress, U. S. Government Printing Office, 1950, Volume 63, Part 2, p. 413.

[2] U. S. Congress, Senate, Committee on Armed Services, Military Construction Authorization Fiscal Year 1964, 88th Congress, Hearings, 1963, p. 479.

> If we are to achieve an all volunteer force, we must provide not only improvements in pay and personnel policies, but also adequate, comfortable housing. [3]

Mr. Perry Fliakas, Director of Facilities Planning and Programming of the Office of Deputy Assistant Secretary of Defense (Installations and Housing), stated in explaining the fiscal year 1975 military family housing program:

> Adequate housing is a morale factor of prime importance. The principal objective of this program, therefore, is to assure that married members of the Armed Forces have suitable housing. To this end, the objectives of the Military Family Housing Program are closely aligned and dovetail with the objectives of the All Volunteer Forces. [4]

From the above comments, the concern for providing decent housing for military families is not only in consonance with stated national objectives, but is also an element for the satisfactory functioning of the all volunteer service concept.

The goal of a decent home and the implementation of the all volunteer service are having a significant impact today on the lower enlisted ranks of the armed services and their housing status. The Department of Defense is currently proposing new initiatives with respect to making military housing quarters available to married personnel in pay grades E-1 through E-3.[5] Accordingly, the FY 1975 military housing

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[3]U. S. Secretary of Defense, Final Report to Congress of Secretary of Defense Melvin R. Laird, January 1969-1973, U. S. Government Printing Office, 8 January 1973, p. 95.

[4]Fliakas, P. J., "Adequate Housing - A Morale Factor of Prime Importance," Commanders Digest, Volume 16, No. 2, 11 July 1974, p. 3.

[5]Throughout this thesis, the term "E-1 through E-3" is to be interpreted as additionally including E-4 personnel with less than two years of service.

requirements base and family housing program encompassed, for the first time these former "ineligibles" for public quarters. The FY 1975 Family Housing Program budget request includes a proposal to construct 3,000 new housing units, and a proposal for 3,000 new lease authorizations. Legislation enacted in 1973 placed E-4 personnel in the eligible category, providing they had over two years of service and a total obligation of six years.

Married E-1 through E-3 personnel have traditionally been authorized to occupy substandard military quarters. More recently, the offering of adequate quarters to these personnel has occurred at military installations where a significant decrease in military base loading has been experienced. In such situations, the E-1 to E-3 personnel are included on the housing waiting list and provided quarters.

At the Naval Complex, San Diego, California, the E-1 to E-3 ineligibles are now included on the waiting list. Under a pilot program of the Navy, E-1 through E-3 personnel are considered as being eligible for military quarters, and are given equal assignment opportunity with other housing eligible servicemen.[6]

B. THE PROBLEM

The military family housing program is a concern of senior government and military officials, and the program

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[6]Chief of Naval Operations Letter to Commandant, Eleventh Naval District, Serial 277/32, Subject: Assignment Policy for Ineligible Personnel to Navy Housing, 12 December 1971.

appears to be in an atmosphere of dynamic change. The subject of housing, be it military or civilian, often engenders an emotional response from people at all economic and command levels. A house is not merely a structure, it is a home.

Military housing management in this environment must be dynamic and responsive. Managers must also be adept at making decisions that provide the greatest resources for the least cost. This is particularly true of housing matters, since decision making in this area often results in a long term commitment of resources. Funds to construct, maintain and operate military family housing assets are derived from tax dollars and, consequently, is a public trust that requires prudent management.

Housing management at all levels must consider the economic ramifications of their decisions. As noted above, the present environment encourages close attention for astute decision making.

Housing managers within the DOD organization are coming into a period of time requiring major housing housing decisions to be made concerning their existing housing assets. A significant portion of the current family housing assets are now over twenty years old and have been classified as marginally adequate in accordance with today's habitability standards. The majority of family housing units constructed under the Wherry Housing Act fall into this category. This act originally produced 82,000 units.

What are the feasible alternatives for managing these marginally adequate housing units? Should the units be rehabilitated and brought up to full habitability standards? Should they be replaced with new construction, or should they be left as is? What are the economic ramifications of these alternatives, and how may the alternatives be compared?

In researching these questions, the authors found the utilization of economic analysis within the Navy for housing to be limited. Limited consideration for life-cycle costing and the time value of money was also evident. Many of the persons contacted were unfamiliar with the language and techniques of economic analysis. It was found that feasibility studies for quarters rehabilitation projects were usually justified or rejected on the basis of initial investment costs, and that alternatives considered consisted mainly of proposed combinations of existing unit arrangements, effecting the elimination of housing assets.

C. OBJECTIVE OF THE THESIS

The authors will propose and explore alternatives available to the Navy housing managers concerning marginally adequate housing assets, construct and apply a suitable economic analysis technique which considers life-cycle costs and the time value of money, and finally compare the alternatives, using a specific naval installation as a practical example. The goal of this thesis is to provide the housing manager with additional tools to better understand and to develop a better strategy in managing his marginally adequate housing assets.

Because of its current dynamic nature within the military housing scene, the objective identified above will be addressed in the context of possible lifting of the "housing ineligible" status for personnel in pay grades E-1 through E-3.

Since the vast majority of DOD housing assets are located within the United States, and military housing on foreign shores is subject to numerous qualifying policies and regulations, the thesis will consider only U. S. domestic military housing.

The Naval Complex, San Diego, California, was the selected example for which to analyze the alternatives available concerning disposition of marginally adequate housing assets. Supporting the complex is a large (and expanding) family housing inventory consisting of over 4,840 units, of which 1,624 are Wherry construction, over twenty years old, and classified as marginally adequate quarters.

D. SYNOPSIS

As an aid to the reader, a summary is included at the end of each chapter which highlights major points and recaps conclusions developed within the body of the chapter. In addition to the summaries, a brief synopsis is presented for each chapter and Appendix A as follows:

Chapter I. The DOD family housing program is undergoing dynamic change with the advent of the all volunteer service and the proposed E-1 through E-3 enlisted housing eligibility authorization. Added impetus has been made for improved management of existing housing assets and particularly for the large and expanding inventory of marginally adequate housing units.

This chapter discusses the objective of the thesis, that of defining and analyzing the alternatives available concerning the disposition of marginally adequate housing assets.

Chapter II. This chapter discusses the history of family housing for the armed forces. The history is traced from the late 1700's through pre-World War II, World War II through 1962, and from 1963 to the present time. Also discussed is the impact of the all volunteer service and E-1 through E-3 housing eligibility authorization for family housing.

Chapter III. This chapter discusses family housing responsibilities and management functions, ranging from the Department of Defense level to the shore activity level. Management and organizational relationships are discussed and are depicted in Figure 6. The remaining sections examine the annual family housing survey, DOD criteria and requirement projections for family housing, and the resulting update of the proposed construction program, the budget submission, and the Five Year Defense Plan. After Congressional authorization and appropriation action, funds are released to DOD for the family housing program and new construction.

Chapter IV. Throughout the life-cycle of a housing unit, major long term investment decisions are required to be made. Even prior to the construction of a housing unit, a conscious decision had to be made to divert resources and manpower to build that unit. This chapter constructs the decision-making problem, as defined by this thesis, through a chronological sequence of major housing decisions. Major assumptions

affecting marginally adequate housing units are defined and identified, in part drawn from existing DOD family housing studies.

Chapter V. Existing Wherry housing units at the Naval Complex at San Diego, California, were chosen to provide a practical example for examination of viable alternatives concerning disposition of marginally adequate assets. This chapter further discusses these alternatives, identifies the base year of analysis, complies the life-cycle investment and O&M costs, and compares the uniform annual costs for each alternative. The chapter concludes with a proposed management strategy applying to the San Diego assets.

Chapter VI. This chapter discusses the most significant non-quantifiable factors for consideration in making housing investment decisions. Specifically addressed are political and strategic factors, human factors, and their interface with and influence on Navy housing investment decisions and the decision-makers.

Chapter VII. This concluding chapter discusses the summary and conclusions of the thesis.

Appendix A. Economic analysis, as an aid to the decision maker, is gaining wide-spread support within DOD and the Navy. This appendix traces the success of DOD and the Navy in implementation of economic analysis in decision making, presents a detailed explanation of the methods and techniques used in economic analysis, and discusses the principles supporting the use of these techniques. The appendix concludes with an

analysis technique meeting DOD criteria, which is used in this thesis to analyze the alternatives available concerning the demise of existing marginally adequate housing assets. Appendix A is strongly recommended for those readers who desire a basic understanding and a practical working knowledge of economic analysis as used today.

II. BACKGROUND

A. HISTORY OF FAMILY HOUSING FOR THE ARMED FORCES

1. Pre-World War II

A requirement to provide family housing for U. S. Armed Forces personnel was initiated with the 1782 act authorizing one covered four-horse wagon and one two-horse wagon for a Major General and his family.[7] Tents and other temporary expedients provided housing for troop use, in addition to the "requisitioning" of local community housing, during this early time frame. Military members were expected to be separated from their families or, if they chose to have the family accompanied, undertook the housing responsibility as a personal matter.

Shortly after the end of the Civil War, when it became apparent that military garrisons were going to become semi-permanent, further consideration was given to housing the families of military personnel. The first formal recognition

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[7]U. S. Congress, House, Committee on Appropriations, Surveys and Investigations Staff, Report on Costs of Operating and Maintaining Capehart, Wherry and Other Family Housing, U. S. Department of Defense, January 1961, p. 3.

for Navy Family Housing took place in 1866 when Secretary of the Navy Gideon Wells issued General Order 75 establishing a quarters allowance equating to one third of their pay for officers who were not provided with family quarters on shore stations.[8]

Navy history reveals that some family quarters were constructed in the early 1800's with the establishment of the first shore facilities. The construction was largely of a permanent type and some of those assets are still in use.

In the years prior to 1900, government quarters were constructed only for key officers whose residence on board the station was required by virtue of importance of their assignment. The construction rationale was not for the comfort or convenience of the members, but rather for the benefit of the government as an essential element of military discipline and protection.[9]

The policy for providing quarters only for key personnel continued in the early 1900's. Specific records are not available to document the actual number of quarters constructed during this time frame; however, at the beginning of World War I, records show that the Navy had 289 family housing units for commissioned and warrant officers.

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[8]Department of Defense, A Study of the Military Family Housing Program, April 1974, p. A-2.

[9]Department of Defense, Report of the Advisory Panel on Military Family Housing Policies and Practices, November 15, 1961, p. A-1.

During World War I, two additional major legislative changes in family housing were enacted. The quarters allowance was extended to married enlisted personnel for whom on-station quarters were unavailable. Secondly, legislation enacted in 1918 provided for the government to assume responsibility for providing quarters for the dependents of commissioned officers, or to pay a commutation of quarters if government quarters were not available.[10]

Following World War I, a limited number of quarters were constructed using several appropriations, including barracks and quarters appropriations as well as Works Progress Administration (WPA) and Federal Works Agency (FWA) appropriations during the early days of the Roosevelt Administration. The inventory of family quarters for the Armed Forces stood at about 25,000 units by 1939.[11] The relative stability in the military manning level, coupled with longer assignment periods at a given installation and a relatively low percentage of married personnel in the service, brought about the essentially static housing requirement at that time.

With the beginning of preparations for the national defense build-up in 1940, the requirement for housing facilities to accommodate the large number of military personnel (and

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[10] Ibid, p. E-4.

[11] Olsen, Paul D., Management of the Operation and Maintenance of Family Housing, Unpublished Masters Thesis, School of Government, Business and International Affairs, George Washington University, 1965, p. 2.

defense workers) who had to be moved into congested areas near military installations and defense plants, became an important consideration. The Navy was particularly interested in providing housing for dependents of servicemen attached to shore installations and at the homeport of men assigned to fleet units.[12] In order to meet the requirement, the first "Defense Housing" was authorized by Public Law 76-671 of June 28, 1940, providing rental housing for persons in national defense activities, to include enlisted military personnel. This rental housing was to be leased to, and operated by, the Navy and War Department, with the titles remaining with the U. S. Housing Authority. The Bureau of Yards and Docks was designated by the Secretary of the Navy as responsible for the development and operation of all defense housing facilities under Navy cognizance.

Public Act 76-781 of September 9, 1940, provided funds to the President in the amount of $100 million for allocation to the Navy and War Department, for the acquisition of land and construction of housing units in the vicinity of military installations and privately owned industrial defense plants, for which the average unit total cost was not to exceed $3,500.

By the end of 1940, the Navy had been granted a total of $56,822,500 for the construction of defense housing.

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[12]Department of the Navy, Building the Navy's Bases in World War II, Vol. I, U. S. Government Printing Office, 1947, p. 371.

Part of this amount came from funds granted by Congress to the Federal Works Administrator under the Lanham Act, Public Act 76-849, approved on October 14, 1940, to provide rental housing for persons in national defense activities, including enlisted personnel.[13]

In 1941, Public Laws 7, 73 and 353 also appropriated funds for the President to acquire land and construct housing for defense activities at or near military installations and authorized use of the rentals to defray costs of operation and maintenance.

Navy Low Cost Defense Family Housing construction projects were completed in 1940 and 1941 at the major naval installations, as exhibited in Figure 1.

2. World War II Through 1963

With the U. S. entry into the war and the resultant critical shortages of materials and manpower, the Navy and the War Department began to curtail its program of providing housing for the families of service personnel at shore stations. The emphasis in housing was then shifted to barracks for enlisted men and bachelor quarters for officers; families were encouraged to remain in less congested localities.

Executive Order 9070 of February 24, 1942, consolidated the housing agencies and housing functions of the Federal Government into the National Housing Agency and concurrently transferred all defense housing located on military installations to the War or Navy Department. The Federal Public

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[13] Ibid., p. 372.

FIGURE 1

NAVY LOW-COST DEFENSE FAMILY HOUSING
CONSTRUCTION 1940 AND 1941

Location	No. Family Units	Designated Use
Norfolk, Va.	1342	Enlisted
San Diego, Ca.	1200	Enlisted
Mare Island, Ca.	300	Enlisted
Newport News, Va.	1200	Civilian Defense
Miami, Fla.	200	Enlisted
Newport, R. I.	600	Enlisted
Pascagoula, Miss.	697	Civilian Defense
Washington, D. C.	745	Enlisted/ Civilian Defense
Alexandria, Va.	300	Civilian Defense
South Charleston, W. Va.	450	Civilian Defense
Hawthorne, Nev.	750	Civilian Defense
Alameda, Ca.	600	Civilian Defense
Charleston, S. C.	236	Civilian Defense

Source: Department of the Navy, Building the Navy's Bases in World War II, Vol. I, U. S. Government Printing Office, 1947, pp. 376-382.

Housing Authority, as a part of the National Housing Agency, relieved the Navy of the responsibility for providing homes for civilian industrial workers.[14]

As World War II progressed, the Hamoja and Emergency Housing Programs were enacted in 1943 and 1944 respectively, in response to the development of a serious morale problem among Navy personnel returning from overseas who wanted their families with them, pending their return to combat areas. The curtailment of military family housing construction after December 6, 1941, in order to expedite essential civilian construction (typically for defense workers), compounded the problem for returned veterans. The dual requirement encompassed (a) the need for emergency family accommodations for men temporarily in the country for further training or awaiting ships under repair or overhaul and (b) the need for minimum-type housing units, suited for more permanent occupancy by returned personnel (and their families) assigned to shore activities for duty or rehabilitation.

a. Hamoja Housing

The Hamoja Program was initiated on September 27, 1943 with the Secretary of Navy approval of the first 1,000 units for transient naval personnel and their families. Each unit consisted of a 20 by 48 foot quonset shell, with living room, kitchen, bath, and bedroom, completely furnished for light housekeeping. Occupancy was limited to transients and

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[14] Ibid., p. 374.

was not to exceed sixty (60) days. The Hamoja units were constructed at or near naval installations throughout the United States, but principally on the West Coast, where the problem was most severe. From enactment until V-J Day, 6,285 units were constructed at the average total cost of $3,350 per unit.[15]

b. Florida Emergency Housing

The Florida Emergency Housing Program in 1944 and 1945 undertook to similarly provide Navy family housing, primarily in the area of aviation training facilities, to meet the serious situation brought about by speculative realty price increases which accompanied the return of tourists after the termination of the war in the European Theater. Veteran Navy personnel were confronted with gross evictions and exhorbitant rents which made it impossible to be accompanied by their families. Under the program, 1,395 low cost emergency rental housing units and trailers were constructed at fifteen locations at an average total cost of $3,290 per family unit.[16] The emergency construction additionally proved to be of major assistance in meeting the critical housing shortage following the close of World War II.

c. Defense Housing Construction

Following the termination of World War II European Operations, a high concentration of civilian and military

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[15] Ibid., pp. 374-375.

[16] Ibid., p. 375.

personnel existed on the West Coast, to prosecute the war with Japan. The West Coast naval installations, unlike those on the East Coast, were predominately located in areas not within reasonable commuting distances of well populated centers. The Navy-Federal Public Housing Agency's Defense Housing Construction Program was initiated in September 1944, to yield 10,000 family units at seventy locations for naval installations in California, Oregon, and Washington, to meet this requirement. Standard design housing units, consistent with best livability, low cost, and construction speed were built where a continuing need was projected, whereas improved trailer-type accommodations were constructed where duration need was definitely known. The program was completed and in use prior to V-J Day, at an average total cost of $3,750 per family unit.[17]

The period of time between the end of World War II and 1949 was largely inactive in terms of family housing construction due to the uncertainty of the nation's long range military plans, and in view of the large number of temporary assets that were then in existence. The makeup of military personnel after World War II, however, consisted of a significantly higher percentage of married men. This factor, coupled with the necessity to retain trained and experienced technical personnel and the establishment of military installations at isolated locations not having adequate community housing support,

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[17] Ibid., pp. 375, 376.

resulted in the demand for housing exceeding the supply, in spite of large military personnel cutbacks coinciding with the end of the war.

d. Wherry Housing

In meeting this demand, Congress in August 1949 passed Public Law 81-211, as an amendment to the National Housing Act (Title VIII). The Wherry Act, as it was called, was to produce a total of over 83,000 family units between its 1949 enactment and 1955 termination, of which 15,000 were constructed at naval installations at twenty-three locations.[18]

The program was originally enacted for one year, and envisioned to produce 60,000 units of family housing at an average cost of $9,000. The Wherry Act authorized privately financed housing projects to be constructed on government-owned land at or near military installations; the land was to be leased to the private project sponsors. The sponsor then arranged to finance (under FHA insured mortgages), construct and operate the housing project. The housing was made available to military and civilian tenants, as determined by the local installation commander, on a rental basis.[19]

Although from its inception the Wherry Act was viewed as the answer to the military housing problem, the resulting construction was often of marginal adequacy and

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[18] A Study of the Military Family Housing Program, op. cit., p. A-3, A-4.

[19] Public Law 81-211, United States Statutes At Large, 81st Congress, U. S. Government Printing Office, p. 570.

quality, and the assets often poorly maintained. In retrospect, the Act was a short range solution to the long range housing problem, and met Congressional approval by virtue of its avoidance of appropriation outlays for construction. The ultimate acquisition of 78,571 Wherry units by the military departments, in conjunction with the later enacted Capehart Program, required extensive rehabilitation and contributed to the already high overall cost of the Wherry Program. The most serious impact, however, was that of decline of Congressional interest in appropriated fund construction.

The Congress, with the enactment of the Housing Act of 1949, amended the Housing Act of 1937 and authorized Federal contributions and loans for 810,000 additional units of low rent public housing over a six year period. The Act, although not directly impacting on military family housing, espoused for the first time in history an overall national goal in housing:

> The Congress hereby declares that the general welfare and security of the nation and the health and living standards of its people require housing production and related community development sufficient to remedy the serious housing shortage, the elimination of substandard and other inadequate housing through the clearance of slums and blighted areas, and the realization as soon as feasible of the goal of a decent home and suitable living environment for every American family, thus contributing to the development and redevelopment of communities and to the advancement of the growth, wealth, and security of the Nation. [20]

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[20] U. S. Department of Housing and Urban Development, Low Rent Housing Guide, Orientation to the Program, (HMG 7401.3), Washington, D. C. April 1971, Chapter 2, p. 2.

e. Defense Housing Commission

President Truman, in 1950, demonstrated support for the importance of military family housing and reinforced importance for the 1949 Congressionally established national housing goal of "a decent home and suitable living environment for every American family," in directing the Secretary of Defense to establish the Defense Housing Commission, whose mission was to conduct an in-depth study of the military family housing problem. The study resulted in the establishment of the Armed Forces Housing Agency, which centralized the responsibility for all aspects of the family housing program, with the exception of fiscal matters. In 1953, the Agency was disestablished and its functions assigned to the then Assistant Secretary of Defense (Properties and Installations).

This series of events led the way for housing appropriations requests from all services to be presented to Congress under a uniform Department of Defense approach in 1954, with the passage of a Department of Defense housing bill. This was the first significant appropriated fund housing program since World War II. The 1954 bill requested $350 million for 25,000 units of family housing construction, for which Congress finally authorized only $175 million for 12,000 family units, in spite of expressed interest on the part of individual Congressmen.

During the period 1954 through 1957, Congress authorized some 32,000 units for appropriated fund construction, of which only about 18,000 were actually funded and built.

Actual funding and construction fell well below authorization levels due to the lengthy reviews to determine whether they could be more suitably developed by the newly authorized (1955) Capehart Program.[21]

By 1955, the DOD housing inventory included approximately 224,000 family housing units, of which some 47,000 were then inadequate Lanham Act quarters built in the 1940's, about 11,500 Title III (Defense Housing and Community Facilities and Services Act of 1951, largely trailers), about 87,000 Wherry units constructed or planned, and about 78,500 appropriated fund quarters (of which only 37,000 were permanent). At that time, DOD estimated its deficit to be 150,000 units.[22]

f. Capehart Housing

As previously stated, the Wherry Program was terminated in 1955; its demise resulting from increasing construction costs and Congressional restrictions on mortgage procedures. DOD was concerned about the funding climate of appropriated fund housing not matching the Congressional authorizations. Accordingly, DOD designed a new improved privately financed military housing program, for which the following encapsules the rationale:

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[21] Report of the Advisory Panel on Military Family Housing Policies and Practices, op. cit., p. C-2.

[22] Golden, Harold, Housing and the Military Family, Unpublished Master's Thesis, Army War College, Carlisle Barracks, Pa., 1972, p. 27.

> Specifically, we sought a program under which the mortgages would cover all construction costs, and ownership of the completed projects would vest in the military departments. 23

Enacted in 1955, the Capehart Program provided for construction of military family housing, on government-owned land, by private contractors who, after competitive bidding, obtained financing of 100% mortgages insured by the FHA and guaranteed by the military departments.[24] The Capehart Program differed from Wherry in that the government took title and assumed the twenty-five year mortgage upon completion of construction, vice being privately operated. The Capehart Act further provided that mandatory acquisition of existing Wherry assets be made at military installations where Capehart projects were to be constructed. This was done to avoid financial losses by the Wherry project owners for fear that the more attractive and spacious Capehart housing would render the Wherry housing unrentable.

The Capehart Program was originally enacted for one year to authorize 100,000 family units to be constructed over a five year period, at an average cost of $13,500, and was later amended to be extended to June 30, 1963 and to raise the average unit cost to $16,500. During the first three years of its seven year life, when line item authorization was not

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[23] Report of the Advisory Panel on Military Family Housing Policies and Practices, op. cit., p. C-4.

[24] Public Law 84-345, enacted 11 August, 1955. The Act was sponsored by Senator Capehart and accordingly became known as Capehart Housing.

required, about 56,900 units were produced. The last four years, during which line item authorization was required, yielded 58,000 units out of a total DOD request of 85,500, due to a Congressionally imposed ceiling forcing DOD to select the most urgent projects for execution.[25]

Congressional opposition developed for continuation of the program in its later stages because of its apparent high cost (largely that of mortgage interest) as compared to the apparent cost of appropriated fund housing; the Capehart Program was allowed to expire on October 1, 1962, having produced nearly 115,000 units of family housing for DOD, of which the Navy obtained 19,943 units.[26]

g. Appropriated Fund Housing

Appropriated fund construction was essentially limited in the 1950-1955 period to the provision of housing for commanding officers and other key officers at Air Force bases, overseas installations where privately financed programs were not feasible, and in some CONUS locations where high costs precluded the use of other programs. Appropriated fund housing construction in the late 1950's was additionally hampered by the effects of overwhelming competition for funding priority with operationally related weapon systems and facilities.

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[25] A Study of the Military Family Housing Program, op. cit., p. A-4.

[26] U. S. Congress, House, Committee on Appropriations, Military Construction Appropriations for 1972, 92nd Congress, 1st Session, 1971 Hearings, Subcommittee on Military Construction Appropriations, Part 1, p. 386.

During the fiscal years 1955-1957, for example, of the 34,400 family housing units requested, 32,400 were authorized, appropriation made for 30,900 units, and only some 13,400 were ultimately funded and built.[27]

As Congressional opposition to privately financed Capehart housing increased, during FY 1960 to FY 1963, a transition in construction authorizations occurred, placing sole reliance on appropriated funds in FY 1963. Figure 2 illustrates the change in construction programming activities during fiscal years 1960 through 1963.

h. Domestic Military Housing In-lease Program

Domestic military in-leasing of privately owned family housing assets, to be occupied as public quarters by eligible military personnel and their dependents, was introduced in 1955. Its function, originally, was to meet the housing needs of military personnel at remotely located tactical installations. As defined in Public Law 81-161, (and further modified by Public Law 33-166), its application criterion was expanded to provide authorization for in-leased housing at all military

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[27] A Study of the Military Family Housing Program, op. cit., p. A-5.

FIGURE 2

CONSTRUCTION PROGRAM ACTIVITY, FY 1960-1962
APPROPRIATED FUND VERSUS CAPEHART

Fiscal Year	Program	Requested by DOD	Authorized by Congress	Appropriated by Congress	Built by DOD
1960	Appropriated	648	471	411	381
	Capehart	22,405	20,000	N/A	20,000
	FY Total	23,053	20,471	----	20,381
1961	Appropriated	998	998	588	583
	Capehart	9,618	5,000	N/A	5,000
	FY Total	10,616	5,998	---	5,583
1962	Appropriated	256	2,256*	2,116	1,916
	Capehart	7,074	3,000	N/A	3,000
	FY total	7,330	5,256	----	4,916
Totals for FY 60-62	Appropriated	1,902	3,725	3,115	2,880
	Capehart	39,097	28,000	N/A	28,000
		40,999	31,725	----	30,880

*Includes 2,000 units requested under the Capehart Program.

Source: Department of Defense, A Study of the Military Family Housing Program, April 1974, p. A-8.

installations in the U. S. (in addition to Puerto Rico and Guam) wherein one or more of the following conditions exist:[28,29]

a. There has been a substantial increase in military strength and such increase is temporary.

b. The permanent military strength is to be substantially reduced in the near future.

c. The number of military personnel assigned is so small as to make the construction of family housing uneconomical.

d. Family housing is required for personnel attending service school academic courses on permanent change of duty orders.

e. Family housing has been authorized but is not yet completed or a family housing authorization request is in a pending military construction authorization bill.

The domestic leasing program is authorized on an annual basis and has provided varying numbers of assets over the years. During the fiscal years 1956 through 1965, for instance, the lease authorization ranged from 1,000 to 5,000 units; whereas, the fiscal year 1972, 1973 and 1974 Military Construction Acts have consistently provided for leasing of 10,000 units, the FY 72 increase being primarily justified on the basis of housing requirements at recruiting centers.

i. Inadequate Family Housing Program

The Inadequate Family Housing Program was created with the enactment of the Military Construction Act of 1957,

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[28]Department of the Navy, Naval Facilities Engineering Command, NAVFAC P-352, Housing Administration, Washington, D. C., August 1972, p. 16-31.

[29]Department of Defense, DOD Instruction 4165.45, Determination of Family Housing Requirements, January 1972.

Public Law 85-241, the purpose of which was to eliminate conditions of inequity resulting from the occupancy of inadequate public quarters by service personnel and their dependents. Service Secretaries were authorized, subject to the regulations, to designate quarters as inadequate public quarters. The legislation was subsequently expanded in 1960 to encompass Lanham Act housing, and in 1962 further broadened to include all housing which military personnel could occupy on a rental basis, (including trailers).

The demolition of designated inadequate quarters was required by the original legislation to take place prior to July 1, 1960, unless alterations or improvements could be made so as to qualify as public quarters. Amendments to that legislation subsequently extended the disposition date to July 1, 1965. Retention of designated inadequate public quarters, (IPQ), as an exception to otherwise required demolition, is authorized providing the following conditions are met:[30]

a. The housing is safe, decent, sanitary, and suitable for occupancy.

b. The housing cannot be made adequate as public quarters within a reasonable time.

c. The rentals charged to or allowances forfeited by the occupants are not less than the costs of operating and maintaining the housing.

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[30] Housing Administration, NAVFAC P-352, op. cit., pp. 16-51, 16-52.

d. There is a continuing need which cannot be appropriately met by privately owned housing in the area.

At such time as any of the above conditions are not met for any IPQ unit, the local commander must initiate action to remove the unit from the family housing inventory.

Annual appraisals are made for inadequate public quarters to determine the fair rental value or amount of BAQ forfeiture. The monthly rental charge is normally not to exceed 75% of the occupant's BAQ.

The disposition alternative for redesignating IPQ assets to non-appropriated fund transient or guest house facilities has been key in providing assets for this function at many locations.

j. Section 810 Housing

Section 810 of the National Housing Act of 1949 was added by Public Law 86-372, on September 23, 1959. It authorized the Federal Housing Administration (FHA) to insure loans on construction of new homes and rental housing for military personnel (and essential DOD civilian and contractor employees) where such housing is determined to be in the interest of national defense. The purposes for Section 810 housing are to:

a. Provide legislative authority for the FHA to insure mortgage loans for housing construction without the requirement that the "property or project be economically sound."

b. Provide a supply of acceptable family housing available on a rental occupancy basis, for an initial five year period, to military (and civilian) personnel of the defense establishment.

c. Encourage development of privately owned housing to meet requirements of DOD personnel, and thus eliminate the need for a portion of government funds for construction, maintenance, and operation of public quarters.

Housing constructed under Section 810 is privately financed, constructed on non-government land and solely operated and maintained by the private sponsor. The approval of a project is predicated on a firm family housing deficit, and requires close liason during the development stages between the perspective sponsor, the local military commander, and the local Federal Housing Administration (FHA) director.[31] The application by the sponsor to the FHA for mortgage insurance is processed with a memorandum of agreement between DOD and FHA, followed by the insertion of a line item authorization at the service secretary level. Although maximum utilization of the 810 program was intended, the program has not provided enough housing to meet a substantial portion of the military requirement.

3. 1963 to the Present

a. Appropriated Fund Housing

Secretary of Defense MacNamara presented requests to Congress for 12,100 units of new construction family housing in FY 64, and 12,500 new units in the FY 65 through FY 68 programs. In substantiating the MILCON requests, he pointed out that 49,000 service families were involuntarily separated

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[31] Ibid., pp. 16-21, 16-30.

from their families for lack of suitable housing, 32,000 families were in substandard quarters, and 106,000 families were living off station in substandard quarters. Congress was, however, reluctant to approve any sizeable appropriations for military family housing; accordingly, approved only 7,500 units for FY 64 and 7,500 units for FY 65. In spite of Congressional urging of DOD to adopt new housing management techniques, comprehensive programs, and a reliance on appropriated fund housing, Congressional support and action on military family housing was less than enthusiastic. The annual approval of 7,500 new units compared unfavorably with the average annual gain of 15,000 new assets over the seven year life of the Capehart Program.[32]

The early 1966 total defense freeze on family housing construction terminated the progress for the 8,500 units previously approved for FY 66. The justification for the freeze was that of necessity to offset ongoing operations costs in Vietnam and to reduce inflationary pressures. No family housing construction authorization was requested by DOD for FY 67. In FY 68, Congress authorized 6,700 units out of 12,500 requested.

DOD requests for family housing MILCON during fiscal years 69 through 74 were approved, either in full or nearly so, yielding authorizations ranging from 2,000 units in FY 69

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[32] Housing and the Military Family, op. cit., p. 30-32.

to 10,691 in FY 74. During these years the genuine interest, on the part of Congress, for military family housing was apparently revived, in the face of rising construction costs, rising operations and maintenance costs, and an increasing backlog of essential maintenance. Figure 3 provides perspective for the housing authorization climate during the fiscal years 1963 through 1974.

Service Secretaries have in the 70's augmented DOD fund allocations for family housing, to register support and emphasis for housing and to specifically upgrade additional existing assets and provide additional family housing units through new construction. The Secretary of the Navy, as an example, provided an additional $20 million augmentation to the FY 71 through FY 74 housing budgets.

b. Improvement Program

The improvement of existing housing assets through alteration, modernization and renovation began to receive great emphasis by DOD and Congress beginning in FY 70, with an initial allocation of $11.5 million out of a total DOD Family Housing Appropriation of $688.5 million. In the following three fiscal years, improvements were funded in successively greater amounts, with $31.6 million in FY 72 so dedicated. The FY 75 Family Housing Authorization requests $20 million for the ongoing improvement program.

As stated by Mr. Perry Fliakas in the FY 73 House Appropriations Subcommittee hearings, concerning the improvement program:

FIGURE 3

DOD FAMILY HOUSING CONSTRUCTION, FY 1963-FY 1974

Fiscal Year	Requested by DOD	Authorized by Congress	Appropriated by Congress	Approved Executed Program--Built by DOD/Under Construction or Contract
1963	16,645	13,792	7,500	7,500
1964	12,100	10,140	7,500	7,500
1965	12,500	9,886	8,250	8,250
1966	12,500	11,180	8,500	8,500
1967	-0-	-0-	-0-	-0-
1968	12,500	10,609	6,750	6,700
1969	2,000	2,000	2,000	2,000
1970	4,800	4,800	4,800	4,570
1971	8,000	8,000	8,000	7,550
1972	9,684	9,862	9,684	8,816
1973	11,939	11,938	11,720	9,932
1974	11,688	10,691	9,816	10,491
Totals	114,356	102,989	84,520	81,809

Source: Department of Defense, A Study of the Military Family Housing Program, April 1974, pp. A-8, A-9.

I know of no program that will pay quicker dividends and provide such substantial benefits in terms of increased morale to the military families who occupy onbase housing as well as provide increased life and liveability to the structures themselves. 33

c. Mobile Home Facilities

Mobile home facilities have likewise taken on increased emphasis in the 70's. Initiated in FY 71, $1.2 million was appropriated for new mobile home "pad" facilities, providing safe, sanitary, and moderately priced accommodations for servicemen owning mobile homes, where the local economy had not met the need. Organized Naval construction forces (SEABEES) and self-help participation were utilized for construction of the bulk of mobile home facilities. FY 73 saw a reduction of demand for trailer pads resulting in a four year DOD requirement projection of 1,325 new pads each year, as compared to the FY 72 projection of 3,350 pads.[34]

d. HUD 235 Home Ownership Program

Section 235 was added to the National Housing Act by the Housing and Urban Development Act of 1968. Its purpose was to enable low and moderate income families, whose income did not exceed 135% of the income limits which could be established for admission to low rent public housing in the area, to buy a home or a membership in a cooperative housing

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[33]U. S. Congress, House, Committee on Appropriations, Military Construction Appropriations for 1973, 92nd Congress, 2nd. Session, 1972, Hearings, Subcommittee on Military Construction Appropriations, Part 4, p. 150.

[34]Ibid., p. 153.

project. HUD makes monthly payments to the mortgagee to reduce interest costs to as low as one percent on a home mortgage insured by FHA. The home buyer must pay at least twenty percent of his adjusted monthly income on the mortgage. Assistance may be provided for new or substantially rehabilitated homes and, in a limited number of cases, for existing homes without rehabilitation.[35]

Although the 235 program has been available to military personnel, specific statistical data is not available to show the extend of utilization by servicemen. The Administration's "freeze" on subsidized housing programs in January, 1973 terminated any further execution of the program.

e. HUD 236 Assisted Rental Housing

HUD Section 236 low income community housing was initiated by Section 120 of the Housing and Urban Development Act of 1970, which specifically authorized military occupancy preference in assisted (government subsidized) rental housing at low and moderate income housing projects. The 236 program provides that the housing be privately financed and constructed on private land. For the purpose of reducing rentals for lower income families, HUD makes periodic payments to mortgagees on behalf of mortgagors, of a part of the interest on market-rate mortgages financing rental projects or cooperative projects.[36]

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[35] Low Rent Housing, Guide Orientation to the Program, op. cit., Chapter 5, p. 5.

[36] Ibid., p. 5.

Agreement between DOD and FHA (acting for HUD) in FY 71 provided for an initial program to yield 4,000 - 5,000 units of low rent housing for military families who qualify (by virtue of income) and desire to occupy them. The DOD goal in FY 73 was to acquire an additional 5,000 - 7,500 Section 236 units. The Administration's "freeze" on subsidized housing programs in January 1973 also terminated the 236 program.

Potential utilization of Section 236 housing by military personnel was in fact drastically reduced in 1972 with the pay raises effected at that time. FHA was additionally reluctant to initiate a 236 project at any "soft" or "questionable" military installation with respect to closure or reduction in base population.

f. New Construction Concepts

Two relatively new construction concepts have recently been utilized in military family housing beginning in the 1970's.

Experimental modular housing projects have been constructed at George AFB and at Norton AFB using the modular construction concept. Modular sections for these two projects were produced by the factory at Apple Valley, California, transported, and erected on concrete slab sites at the two project locations.

The relocatability feature of the project was tested by completely erecting a unit at the factory, disassembling the unit, transporting it to Norton AFB, and re-erecting and refinishing it on its foundation. The test results

indicated that total unit construction costs are lower than comparably designed conventional construction, relocation can be accomplished economically, and that modular construction can provide beneficial occupancy in a much shorter time frame than that of conventionally designed housing construction.

In the 1970's, faced with rapidly rising construction costs and the statutory upper limit on average unit costs, coupled with expanded housing deficits at military installations for which the Shore Establishment Realignment (SER) Program had increased the base loading, and an increased demand for attractive quality family quarters in the all volunteer service environment, DOD began to utilize turnkey contracting in the construction of military family housing.

In the Navy's one step turnkey contract procedures, instead of providing construction contractors with a set of rigid, Navy designed plans and specifications for bidding, proposals are requested from prospective contractors for accomplishment of both design and construction. The perspective contractors are also provided with stated technical requirements and quality/cost evaluation criteria for the project. Negotiation with the selected contractor ensues for modification and clarification of final points in the proposal.[37] The Army and Air Force initially preferred the two-step turnkey procedure,

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[37]Department of the Navy, Naval Facilities Engineering Command, NAVFAC Instruction 11101.85A with Changes 1, 2 and 3, Turnkey Procedures for Navy Family Housing Projects, February 19, 1971.

in which contractors having submitted satisfactory technical proposals, are invited to submit formal construction bids.

The advantages of the turnkey method include reduction of time and cost involved in the preparation of plans, specifications, bidding, and award of contract, in addition to improved end product quality, esthetics, and liveability.

Presently, turnkey contract construction is being utilized for approximately 85% to 90% of Navy family housing units, and to a large extent within the other services.

g. Current Family Housing Inventory Status

As of the beginning of FY 1974, the DOD family housing inventory stood at nearly 380,000 units worldwide, of which over 260,000 units are located within the continental United States. Included in the inventory are over 11,000 in-leased units provided by civilian communities in the U. S. and in foreign countries.[38] Figure 4 depicts the inventory breakdown by military service, housing category and location.

Over 165,000 of the units in the DOD housing inventory are encumbered by a mortgage, for which an annual outlay in the amount of approximately $159 million is paid on the principal and interest. The June 30, 1974 outstanding debt for encumbered housing stood at $1.37 billion.

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[38] A Study of the Military Family Housing Program, op. cit., p. 13.

FIGURE 4

SUMMARY OF DOD FAMILY HOUSING INVENTORY
(As of June 30, 1973)
Thousands of Units

	Worldwide	Conterminous United States	Alaska, Hawaii and Possessions	Foreign
TOTAL DOD	380.6	261.5	35.6	85.6
Army	138.6	79.1	11.1	48.3
Navy	89.8	68.1	13.2	8.4
Air Force	151.6	114.2	11.2	26.2
Defense Agencies	.7	.1	-	.6
Breakdown by Categories				
Adequate Units	353.3	237.6	34.0	81.6
Substandard Units	27.3	23.8	1.6	1.9

Source: Department of Defense, A Study of the Military Family Housing Program, April 1974, p. 13.

By the end of FY 1975, the cumulative total authorized housing construction for DOD will have exceeded 93,000 units, while total inventory will have increased (in consideration of adjustments) to 47,000 units. Adjustments include a loss of 12,000 units resulting from base closures and SER effects, 20,000 units declared substandard, and the remainder lost from inventory for various other reasons.

Figure 5 provides a recap for numbers of military personnel living in adequate quarters. It may be noted that less than three percent of personnel in pay grades E-1 through E-3 are housed, in view of their non-eligibility status. Approximately 24% of all eligible enlisted personnel are occupying adequate military quarters.

B. IMPACT OF THE ALL VOLUNTEER SERVICE AND E-1 THROUGH E-3 HOUSING ELIGIBILITY AUTHORIZATION

1. All Volunteer Service

a. Historical Sketch

On October 17, 1968, President Nixon presented his views on compulsory military service in the following statement:

> I say it is time we took a new look at the draft--at the question of permanent conscription in a free society. If we find we can reasonably meet our peacetime manpower needs by another means--then we should prepare for the day when the draft can be phased out of American life. 39

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[39] U. S. Secretary of Defense, Report to the President and Chairman of Armed Services Committees of the Senate and of the House of Representatives (P.L. 92-129), Progress in Ending the Draft and Achieving the All-Volunteer Force, U. S. Government Printing Office, August 1972, p. 1.

FIGURE 5

MILITARY PERSONNEL OCCUPYING ADEQUATE QUARTERS
PERCENTAGE BREAKDOWN BY PAY GRADE GROUP

	Number of Personnel in Uniform[a]	%Married or With Other Dependents[c]	% of Previous Column in Adequate Military Quarters	Number in Quarters[b]
ALL ENLISTED	1,921,428	54.9	23.8	251,468
E-1 to E-3	766,916	27.8	2.9	6,218
E-4 to E-6	970,187	68.6	29.5	196,557
E-7 to E-9	184,325	95.9	27.6	48,693
ALL OFFICERS	320,190	82.4	37.3	98,287
W-1 to W-4 and O-1 to O-3	207,101	75.7	37.6	59,009
O-4 and O-5	95,802	94.5	35.0	31,669
O-6	16,017	96.4	43.7	6,749
O-7 and above	1,270	98.6	68.7	860
ALL PERSONNEL	2,241,618	58.9	26.5	349,773

a/ FY 73 end strength

b/ From DD Forms 1411, January 1973

c/ From Service budget submissions

Source: Department of Defense, A Study of the Military Family Housing Program, April 1974, p. 14.

The statement was made during a period in which a variety of student and other deferments had undermined confidence in the fairness of the draft system, and in which the draft eligibility period (age 18 to 26) presented great uncertainty for young men in planning for education, career and family. The country was further entrenched in direct support of the Vietnam War effort at its highest level, and experiencing a draft induction level of 299,000 men in 1968.

In addition to those drafted during this time frame, more than half of the young men enlisting did so because of the draft, not because they were true volunteers. Thousands more enlisted in the Army and Air National Guard and reserve units because they perceived these organizations to be without a mission, undeployable, and a safe haven from the draft and the Vietnam War.

President Nixon in March 1969, appointed the Advisory Commission on an All-Volunteer Armed Force to develop a plan for eliminating conscription and moving toward an all-volunteer service (AVS). The study, under the chairmanship of the Honorable Thomas Gates, Jr., former Secretary of Defense, was to encompass a broad range of possibilities for increasing the supply of volunteers for service. Among them were included increased pay and benefits, recruitment incentives and measures to make military careers more attractive to young men.

The Advisory Commission's report concluded that the nation's interests would be better served by an AVS,

supported by an effective standby draft, than by a mixed force of volunteers and conscripts. It further stated that the first indispensible step required in moving toward the AVS was to remove the existing inequity in the pay of men serving their first term in the armed forces, and estimated additional costs in the amount of $2.7 billion in FY 1971, for projected implementation by 1 July, 1971.[40]

The Advisory Commission reasoned that when force levels became stabilized, the additional expenditures needed in the transition process would be partially offset by savings engendered through higher retention levels, lower turnover, and a reduction in the number of persons in training status.

It was further suggested that although the budgetary expense of an AVS would be higher than for the then existing mixed force of volunteers and conscripts, the actual cost would be lower, in view of hidden costs such as the tax-in-kind paid by servicemen forced to serve in the military at artificially low wages, subsidizing those in society who do not serve.[41]

The DOD sponsored Project Volunteer Committee convened in April 1969, provided data to the Advisory Commission during the conduct of its study, and continues to function as

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[40]U. S. President, Commission On An All-Volunteer Armed Force, U. S. Government Printing Office, February 1970, Volume I, p. 5-7.

[41]Ibid., p. 8.

the DOD steering group responsible for directing overall plans and monitoring the effectiveness of the AVS implementation. Both the Committee and the Commission recommended substantial pay increases for junior enlisted personnel, selective pay incentives for specialists, additional ROTC scholarship support, and a greatly expanded recruiting program. The Committee placed additional stress on the need to retain members of the career force and to preserve the strength of Guard and Reserve components.

The Committee's recommendation to extend induction authority to 1 July, 1973 vice 30 June, 1971, as recommended by the Gates Commission, was approved by the President and by Congress, contributing to a more orderly transition to AVS and the ability to test the effectiveness of a variety of AVS programs while maintaining the necessary strength and quality of the military forces.[42]

The recommended increased pay rates became effective 14 November, 1971, and were followed by a cost-of-living increase in January, 1972. Additional legislative provisions expanded subsistence support and ROTC scholarships and provided funds to improve recruiting activities and upgrade the quality of life at military installations.

A large portion of the FY 1974 MILCON Program was directed toward improving the attractiveness of military life

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[42] Progress in Enging the Draft and Achieving the All-Volunteer Force, op. cit., p. 8.

in order to maintain an all volunteer service. Within the realm of family housing, the program requested new construction of family housing units in the amount of $351.9 million, construction of facilities for mobile homes in the amount of $5.7 million, and improvements/alterations to existing public quarters amounting to $62.5 million.[43]

In his final report to the Congress in January 1973, Secretary of Defense Laird promoted the need for continued military housing emphasis in an AVS environment:

> If we are to achieve an All-Volunteer Force, we must provide not only improvements in pay and personnel policies, but also adequate, comfortable housing. We have come a long way from the World War II vintage billeting . . . [44]

He cited achievements realized during his 1969-1973 tenure including construction of 34,830 family housing units, improvements of 364,585 existing units, provision of 5,069 mobile home spaces, and additional efforts to improve housing as exemplified by the inclusion of formerly ineligible E-4 personnel (with less than 4 years service) for housing, upgraded space and living standards, and assistance to locate housing in civilian communities.

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[43]U. S. Congress, Senate, Committees on Appropriations and Armed Services, Military Construction Authorization Fiscal Year 1974, 93rd Congress, 1st Session, 1973 Hearings, Joint Committees on Military Construction Authorization, p. 58.

[44]Final Report to the Congress of Secretary of Defense Melvin R. Laird Before the House Armed Services Committee, op. cit., p. 95.

b. Historical Progression for E-1 Through E-3 Housing Eligibility

The 1961 Gilpatric Report on family housing policies and practices addressed the need and made recommendations to expand enlisted housing eligibility from the then existing cutoff at E-4 with over seven years service to E-4 with four years service. The report further addressed the needs for housing the estimated 200,000 military families in still lower grades, citing their difficulties in obtaining suitable housing within their limited financial means, and the consequently low re-enlistment rate.[45]

The Secretary of the Navy's Task Force Personnel Retention Study conducted in 1966, again, recommended that entitlement to public quarters (in addition to dependent travel, household effects shipment, and dislocation allowance) be extended to all E-4 personnel having made a career designation commitment. The cited rationale supporting the recommendation was that a man having once selected the Navy as his career should be entitled to all career benefits; a supporting statistical analysis pointed out that once a man is married and starts a family he is more likely to remain in the Navy.

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[45] Report of the Advisory Panel on Military Family Housing Policies and Practices, op. cit., p. 21.

> Primarily, career personnel should be made to feel as if they were first string members of the Navy team. They should feel no requirement to apologize to their families for second rate accommodations as compared to their four year (completed service) contemporaries . . . 46

Although no direct Congressional action was taken on the basis of recommendations presented by the SECNAV Task Force Study, a DOD sponsored Interservice Study Group was initiated in March 1968, whose objective was to re-examine DOD policies concerning family housing. The study specifically focused on existing criteria requirements, and members were enjoined to make recommendations for necessary and desirable revisions.

Conclusions reached by the Interservice Study Group pertaining to family housing for lower pay grade enlisted personnel included the following:[47]

a. Existing DOD criteria do not recognize the actual state of affairs in that the housing requirements of non-career family households are ignored, and are inconsistent with the National Housing Policy.

b. Gross housing requirements determination criteria should be expanded to include personnel in pay grade E-4 with less than four years active duty who have acquired a six year active duty commitment.

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[46] U. S. Secretary of the Navy, Report of the Task Force on Navy/Marine Corps Personnel Retention, Department of the Navy, 25 January 1966, Volume IV, p. 51.

[47] Department of Defense, Interservice Study Group Report on Military Family Housing, Office of Assistant Secretary of Defense (Manpower and Reserve Affairs), 1 July 1968, p. 2.

c. Entitlement to dependent travel, shipment of household goods, and dislocation allowance should be extended to these same personnel.

As a result of prior efforts, the Office of the Secretary of Defense did, in January 1969, change its policy to permit family housing to be programmed and authorized for personnel in pay grade E-4 with less than four years service, but who had a six year service obligation.

During the FY 1972 Senate Subcommittee Hearings for Navy Military Construction, Rear Admiral W. M. Enger, Commander, Naval Facilities Engineering Command, presented an appeal for extending housing eligibility to lower pay enlisted men (E-1 through E-3).

> As we move to an all volunteer force, we must recognize the reality that large numbers of our lower pay enlisted men who now are presumed to be without dependents, do in fact have families . . . We must recognize that all personnel will perform with greater dedication and more efficiently if they can be with their families in decent housing when ashore. We are going to put more effort on surfacing and getting increased consideration of the family housing and related needs of these men. [48]

Admiral Enger's statement was made during a time frame in which implementation of HUD Section 236 low income community housing was envisioned to suffice the primary housing resources for lower enlisted personnel.

Mr. Perry J. Fliakas, Director of Housing Programs, Office of the Deputy Assistant Secretary of Defense

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[48] U. S. Congress, Senate, Committee on Appropriations, Military Construction Appropriations for FY 1972, 92nd Congress, First Session, 1971, Hearings Subcommittee on Military Construction Appropriations, p. 213.

(I&L), additionally revealed during the FY 72 Senate Hearings, that joint efforts had been made, with counterparts in OSD, toward achievement of the long range goal of broadening the existing programming criteria to include all marrieds. He emphasized that, in consonance with AVS and the zero draft concept, the line of demarcation between eligibles and ineligibles should be erased and that all marrieds with a career commitment should be considered for housing eligibility.

In FY 1974, the housing survey and the housing programming base used to determine new construction housing requirements were expanded to include all E-4 personnel. The expansion was projected to result in an additional requirement for approximately 53,000 units.

The FY 1975 Family Housing Program, encompassing requirements for all military personnel, reflects a programmable housing deficit of 77,000 units of which 28,000 are attributed to E-1 through E-3 personnel previously considered ineligible.

The FY 1975 Program has requested 3,000 units of new construction and authority for 3,000 additional domestic leases, expressly for personnel in pay grades E-4 (with over two years service) and below. In conjunction with the proposed housing for E-4 and below, requests for expansion of entitlements for travel and transportation allowances have been made.

C. SUMMARY

The history of military family housing, from its earliest beginning in 1782 to its present day status, reveals a significant increase in asset inventory, in addition to great strides having been made in terms of design sophistication and liveability.

Since the beginning of FY 1950, additions to the family housing inventory within the United States have been accomplished through four different programs, utilizing appropriated funds, private financing (for Wherry and Capehart), and the leasing of private housing. The programs using private financing (Wherry and Capehart) have, by far, produced the major number of assets, accounting for more than 200,000 units.

Two major factors, increased military pay and allowances, and vigorous DOD/Congressional action to provide suitable housing on base and within the community, have in the 1970's jointly served to reduce the deficit of adequate quarters to a manageable level.

The more recent venture into an all volunteer service environment has accentuated the requirement for not only basic housing provisions, but additional consideration for esthetics and liveability, in order to attract and retain qualified personnel in the military service.

The long range goal of providing adequate housing for all military families has experienced increased momentum; E-1

through E-3 eligibility is being specifically viewed by Congress in the FY 1975 family housing program.

III. NAVY HOUSING MANAGEMENT

A. MANAGEMENT RESPONSIBILITIES

Management responsibilities for Navy family housing span a wide level of offices, departments and activities. The organizational relationships of the various levels are shown in Figure 6 and are discussed below.[49]

1. Activity Level

Commanding officers of shore activities are responsible for insuring that the family housing under their jurisdiction is effectively managed, and that servicemen eligible for family housing have adequate opportunity to occupy government quarters. The Commanding Officer is is also tasked with the responsibility to advise higher authority of activity requirements for additional family housing facilities and essential repairs and improvements.

Since family housing is one of several functional areas of a Public Works Department, the Commanding Officer delegates the responsibility for supervising and directing the family housing operation to the Public Works Officer.

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[49]Department of the Navy, Civil Engineer Corps Officers School, Public Works Manual, Part A, Port Hueneume, California, October 1973, p. 9-8.

The Public Works Officer, in turn, normally delegates considerable authority for family housing matters to the Housing Manager. The execution and controlling of the family housing operation is therefore largely vested with the Housing Manager.

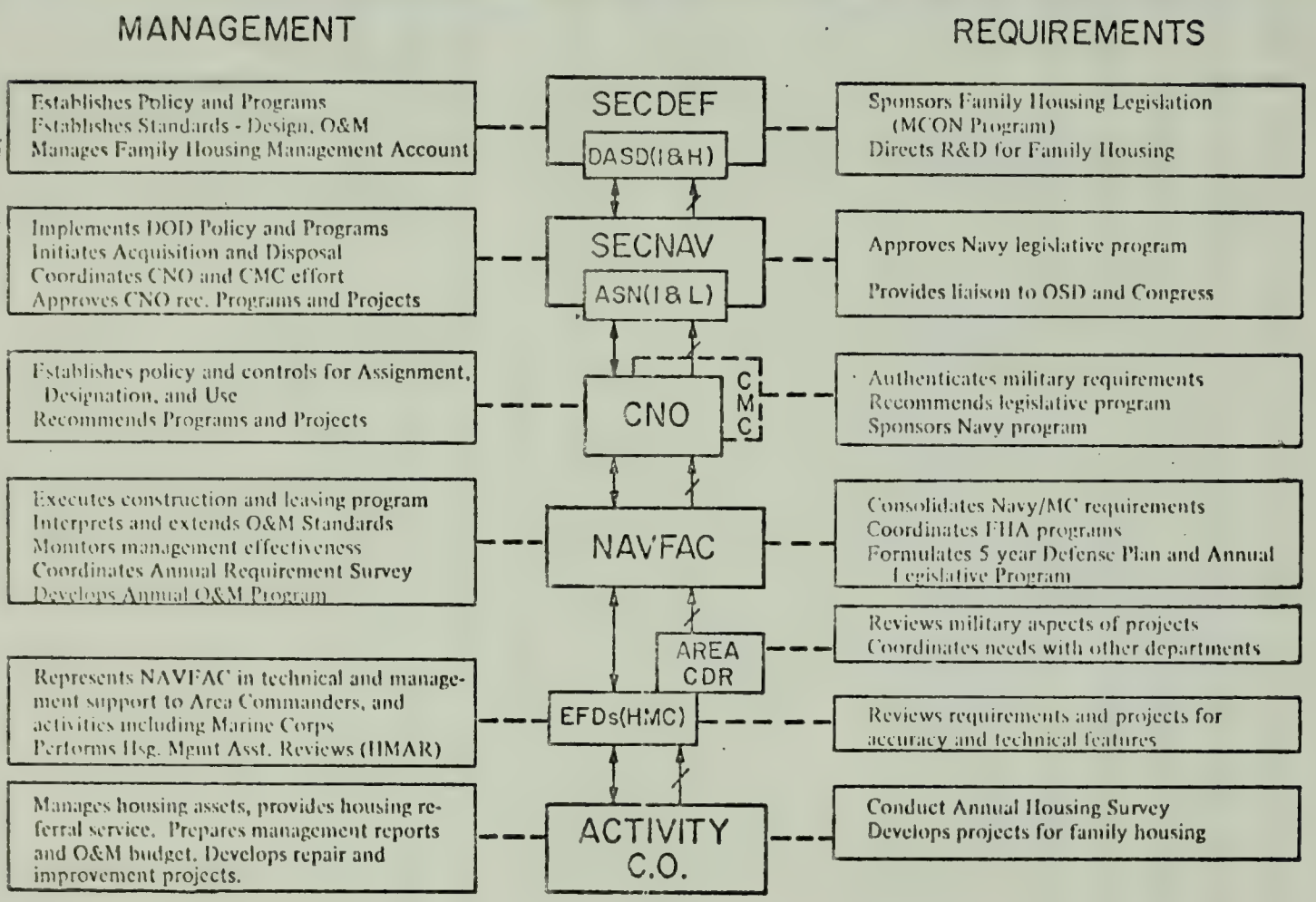
At major naval complexes served by Navy Public Works Centers (PWC), the Commanding Officer of the PWC is responsible for the associated housing plant account, and the management and operation of the Navy housing assets. The standard PWC organization encompasses a housing officer and housing manager who are similarly delegated extensive authority for the family housing operation within the complex.

2. Middle Management Level

The Engineering Field Divisions (EFD) and the Housing Management Centers (HMC) of the Naval Facilities Engineering Command (NAVFAC), comprise the middle management for Navy family housing. Four of the six EFD's, specifically the Atlantic, Pacific, Chesapeake, and Naval Education and Training Branch of the Southern Division (NETBRAN), encompass HMC's within their organizations, and all are engaged in the management of the Navy's complete housing inventory. The HMC's furnish activity commanding officers the funds, technical guidance and direction in the administration and operation of their family housing assets. The HMC's are also, with the exception of the NETBRAN, the principal staff advisors to the Naval District Commandants and Area Commanders for housing matters.

FIGURE 6

FAMILY HOUSING ORGANIZATIONAL RELATIONSHIPS



3. Department Level

The Commander, NAVFAC is the Navy program manager for family housing and as such, provides staff and advisory services to the Chief of Naval Operations (CNO) and the Commandant of the Marine Corps (CMC). NAVFAC manages, maintains and operates Navy family housing, monitors management effectiveness through periodic on-site inspections and analysis of performance reports; formulates budgets and legislative proposals; administers housing appropriated funds for field activities; and establishes allowances, standards and inventory procedures for family housing real property.

As technical advisor, NAVFAC executes the Navy department's domestic and foreign leasing program; plans, designs and constructs new family housing; and develops and executes improvement programs for existing Navy housing.

Functions of a military coordination nature, such as the allocation, assignment and utilization of Government-owned or controlled housing and referral of servicemen to available community housing, are administered by the Naval District Commandants and area coordinators.

The CNO has ultimate responsibility for the management of family housing at all naval shore activities. In addition, the CNO is responsible to the Assistant Secretary of Navy (Installations and Logistics), [ASN (I&L)] for recommending annual legislative proposals and programs concerning acquisition, improvement, maintanance and operation or disposal

of family housing for the entire Department of the Navy. CNO is thus considered to be the program sponsor and coordinator for these matters.

The Secretary of the Navy (SECNAV) is responsible for implementing the policies and programs of the Department of Defense. The specific responsibility for administering DOD programs and policies within the Navy Department is assigned to ASN (I&L). He is the principal advisor and assistant to SECNAV for family housing matters.

The family housing program for the military services (with the exception of the U. S. Coast Guard) is centralized and coordinated at the Department of Defense level. Specific program management is exercised through the Deputy Assistant Secretary of Defense for Installations and Housing [DASD (I&D)]. The DASD (I&H) promulgates all service-wide policies and programs, design standards, and operation and maintenance standards.

B. HOUSING CRITERIA AND REQUIREMENTS

1. Overview

It is the policy of the Secretary of Defense to rely first on community support to provide housing for married military personnel.[50] Projects to provide additional on-base public quarters or authorizations for government in-leased

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[50] Fliakas, P. J., "Adequate Housing - A Morale Factor of Prime Importance," op. cit., p. 3

housing units are considered under any of the following circumstances.[51, 52]

a. Adequate Housing is not Available or is in Short Supply

There are several possible reasons why the market has failed to supply the military demand. Private builders may view the investment as too risky because of the possibilities of base closures or reductions in troop strength. This is also a consideration in planning the military family housing program. Some investors also view military personnel as undesireable tenants and may prefer not to build if the housing is likely to be occupied by military personnel.

b. Adequate Housing is Available but at a High Cost

This is particularly true in some larger metropolitan areas, such as Washington, D. C. Military personnel living in government quarters in this environment are paying less than the market value for their housing and are essentially receiving a subsidy. Conversely, the majority of married military personnel who live on the private economy are paying rental costs over and above their basic allowance for quarters (BAQ).

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[51] Housing Administration, NAVFAC P-352, op. cit., p. 2-1.

[52] A Study of the Military Family Housing Program, op. cit., pp. 2, 3.

The BAQ is also insensitive to family size. A person with a large family, who occupies a five-bedroom set of quarters, draws the same BAQ and therefore pays the same rent as another person of the same pay grade with a small family who occupies a two-bedroom set of quarters.

c. Isolated Areas

Because of the remote location of some military facilities, builders may desire to invest their construction efforts in areas of larger demand with more attractive profit incentives. In an area where military personnel constitute a large proportion of the local population, FHA will not insure mortgages.

d. Adequate Housing is Present in the Community but not Available to Personnel Because of Discrimination

Discrimination is against the law and can in many instances, be countered by legal action against property owners and landlords. It is the policy of the Department of Defense to declare the units of discriminating landlords off-limits, which in effect decreases the private housing support of the community.

e. Certain Key Personnel are Required to Live on the Installation

Only a small number of persons fall into this category and there are probably enough quarters available from existing assets to take care of this requirement.

2. Determining Housing Requirements

The determination of need for family housing at a military installation is based on a statistical sampling survey of military families, and a comparison of estimated and projected requirements and estimates. The gross requirement for a Naval installation is based on the lowest strength figures as determined from the Manpower and Personnel Management Information System, R-316 Report.[53] Sustained strength figures are developed from this report for the current and the next five fiscal years. These figures are multiplied by established statistical factors to determine the number of married personnel, which constitutes the gross family housing requirement. As discussed in Chapter II, E-1 through E-3 married personnel have been included in the FY 75 Housing Survey for the determination of gross requirements.

From the gross requirement is deducted all existing assets which include public quarters, private rentals, leased units, private units occupied and/or owned by military personnel, units under construction or firmly planned in the community, and units occupied out of the area by families not desiring to move into the area (voluntary separations). Assets also include authorized and proposed military family housing quarters for construction. Military housing will not be

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[53]Department of the Navy, Naval Facilities Engineering Command, NAVFAC Instruction 11101.91, Survey of Family and Bachelor Housing Requirements, 13 November 1973, p. 17.

programmed or constructed if the total number of adequate units available, both on an installation and in the surrounding community, exceeds 90% of the gross requirement for that particular installation.[54]

The actual determination of need for family housing at military installations is accomplished annually through the Family Housing Survey.[55,56] Current and projected housing assets are projected in the survey and subtracted from the current and projected housing requirements, giving the family housing deficit for the installation. This information generated by the survey is consolidated, tabulated, and provided for inclusion in the Navy and Department of Defense Five Year Defense Plan (FYDP). The information is subsequently presented to the Congressional Committees of Congress to support individually recommended housing projects.

The gathering of information required by the survey is a comprehensive task. Survey results must reflect local housing conditions as accurately as possible. The military need is discussed at regular intervals with local Federal Housing Administration representatives, local government

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[54]Department of the Navy, Naval Facilities Engineering Command, NAVFAC P-328, Military Construction Program Management, June 1971, p. 14-3.

[55]Determination of Family Housing Requirements, DOD Instruction 4165.45, op. cit.

[56]Department of the Navy, Chief of Naval Operations, OPNAV Instruction 11101.37, Survey of Family and Bachelor Housing Requirements, 23 March 1972.

officials, Chambers of Commerce, real estate boards, home builder's associations, and other housing officials. Realtors and landlords are encouraged to keep local military installation commanders advised concerning the amount of suitable rental housing available, as it is in this category where the greatest housing asset fluctuations can occur.[57]

In order for a vacant rental unit to be allowed for inclusion in the survey, the dwelling must meet established criteria as to location, condition, and cost. Additionally, it must be definitely available to a military tenant without discrimination or restriction to children. If the rental unit entails a lease agreement in excess of a one month duration the lease agreement must contain a suitable military transfer clause. The criteria for which existing private and public rental housing (including trailers) must meet to be considered as an allowable or adequate asset are as follows:[58]

a. Location

The distance from the administrative area of the installation can be travelled by privately-owned vehicles in one hour or less during rush hour. Military necessity in some instances may be applied to shorten this time limitation.

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[57] Military Construction Program Management, NAVFAC P-328, op. cit., p. 14-2.

[58] Survey of Family and Bachelor Housing Requirements, NAVFAC Instruction 11101.91, op. cit., pp. 50-51.

b. Cost

The average total monthly cost, including rent plus utilities and other operating costs (except telephone) paid by the occupant, and allowable transportation costs, must not exceed an established schedule of Maximum Allowable Housing Costs. (See Figure 7)

The Maximum Allowable Housing Costs (MAHC) were first established in 1963 as a result of critical comments by Congressional Committees concerning the Basic Allowance for Quarters (BAQ) as a limit for reasonable housing costs. It was pointed out by these Committee members that BAQ was intended to be the median cost level at which adequate private housing should be obtained over the span of several tours, and therefore, was incorrect to consider BAQ as the absolute maximum acceptable housing cost. Accordingly, the Office of the Secretary of Defense (SECDEF) developed the schedule of MAHC for use in 1963 for the FY "65" Family Housing Survey. Amounts payable for housing were established for military pay grades based on comparisons of the average net effective income and housing costs computed for each grade, using comparable civilian income and housing costs according to data published by FHA.

On 16 December 1967, Congress passed a law which provided for an automatic cost-of-living increase and introduced the Regular Military Compensation (RMC) concept as the

FIGURE 7

MAXIMUM ALLOWABLE HOUSING COSTS
(As of 20 November 1974)

PAY GRADE	BAQ	MAHC
O-6	$ 272.70	$565.00
O-5	252.00	510.00
O-4	227.40	455.00
O-3	206.40	385.00
O-2	185.40	310.00
O-1	149.40	230.00
W-4	219.30	435.00
W-3	202.20	370.00
W-2	183.30	300.00
W-1	169.80	260.00
E-9	194.40	380.00
E-8	181.80	320.00
E-7	170.40	280.00
E-6	158.40	240.00
E-5	146.40	205.00
E-4	128.10	175.00
E-3	110.70	160.00
E-2	110.70	150.00
E-1	110.70	140.00

Source: Deputy Assistant Secretary of Defense (Installations and Housing) Memo to all Service Secretaries, Subject: Maximum Allowable Housing Costs; Promulgation of, 20 November, 1974.

military equivalent of a civilian salary.[59] The RMC was defined as the sum of basic pay, BAQ, Basic Allowance for Subsistence (BAS), and the tax advantage of the two allowances. With the introduction of the RMC concept, recognition was again given to the fact that BAQ was no longer an appropriate index of what the military man should pay for housing.

The MAHC is determined from the expense incurred by civilians of a comparable income group in accordance with FHA statistics. The MAHC is established at the 75 percentile of the range of housing costs incurred by the comparable civilian income group. This figure is compared to the 25% figure of the RMC and the MAHC is set at the lesser of the two.

c. Condition

The final criteria for which existing private and public rental housing must meet to be considered an asset, is the condition of the dwelling. The unit must be a complete dwelling, having a private entrance, sole use of bath and kitchen facilities, and the entry to all bedrooms does not require passing through any other bedroom. The unit must be well constructed and in a good state of repair, with kitchen equipment and heating system provided. The residential area must meet acceptable standards for health and sanitation,

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[59]Public Law 90-207, United States Statutes at Large, 90th Congress, U. S. Government Printing Office, p. 649.

and not subject to offensive fumes, industrial noises, and other objectionable features. Minimum net floor areas of civilian rentals must meet the following criteria:[60]

One bedroom unit	550 square feet
Two bedroom unit	750 square feet
Three bedroom unit	960 square feet
Four bedroom unit	1,080 square feet

3. Family Housing Survey

The Navy family housing survey is conducted during the first quarter of each calendar year, on a military "complex" basis. The Naval District Commandant or the Area Commander appoints an overall family housing survey coordinator for their respective areas and insures that a local family housing complex coordinator is appointed at each geographic family housing complex.[61] The local family housing complex coordinator is responsible for the actual conduct of the survey.

All, or in some years, a statistical sample, of the married personnel at each geographic location are required to fill out a family housing questionnaire (NAVFAC Form 11101.22 [Rev 10-73]). Four documents are used in the Family Housing Survey to establish the requirement for military owned family

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[60]Only under unusual circumstances will units be declared inadequate solely because of insufficient floor area.

[61]Department of the Navy, Chief of Naval Operations, OPNAV Instruction 11101.29, Assignment of Authority and Responsibility for Family Housing, 12 December 1971.

housing. These forms, which are reviewed annually for possible revision to reflect updated needs are:

a. NAVFAC form 11101.22 (Rev 10-73)
"Questionnaire on Family Housing"

This is the basic document completed by the serviceman that is used to gather information on existing private housing conditions as of the date of the survey.

b. DD form 1377
"Tabulation of Family Housing Survey"

All data from the input documents are tabulated and compiled by ADP and presented on this form.

c. DD form 1378
"Determination of Housing Requirements and Project Composition"

The completed form exhibits data concerning expected future base loading and military housing five years from the current survey date, for determination of projected requirements and housing compositions (unit tabulation by number of bedrooms required). These projected requirements are used in deriving the gross housing deficit.

d. DD form 1379
"Narrative on Family Housing"

This form contains a narrative description of the installation's mission, location, community support, on-base housing assets, and projection of proposed housing. Much of the information on this form is used for presentation before Congress to justify the construction of military housing.

The FY 1975 housing deficit for eligible personnel (E-4 and above) based upon the calendar year 1973 housing survey is as follows:

Branch of Service	Deficit
Air Force	13,900
Army	21,631
Navy/Marine Corps	13,590
	49,121

The eligible program deficit of 49,121 would be increased by some 28,000, by including E-1 through E-4 personnel for a new total program deficit of approximately 77,000.[62]

4. Programming

After the gross deficit is determined for a military installation, the type and amount of housing to be programmed and requested for Congressional authorization is determined. Programming is based on full consideration for such factors as the length of time for which the military installation's strength levels will be maintained, adequacy of existing and potential community support, existing military controlled housing, and prospective changes in availability of suitable private housing.[63]

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[62] Study of the Military Family Housing Program, op. cit., p. 21.

[63] Military Construction Program Management, NAVFAC P-328 op. cit., p. 14-3.

Precise programming has been difficult in recent years with the reduction and realignment of military force levels. New terms have appeared, such as "hard core" installation. A "hard core" installation is one that will not be closed, and will most likely either remain the same or increase in force level.

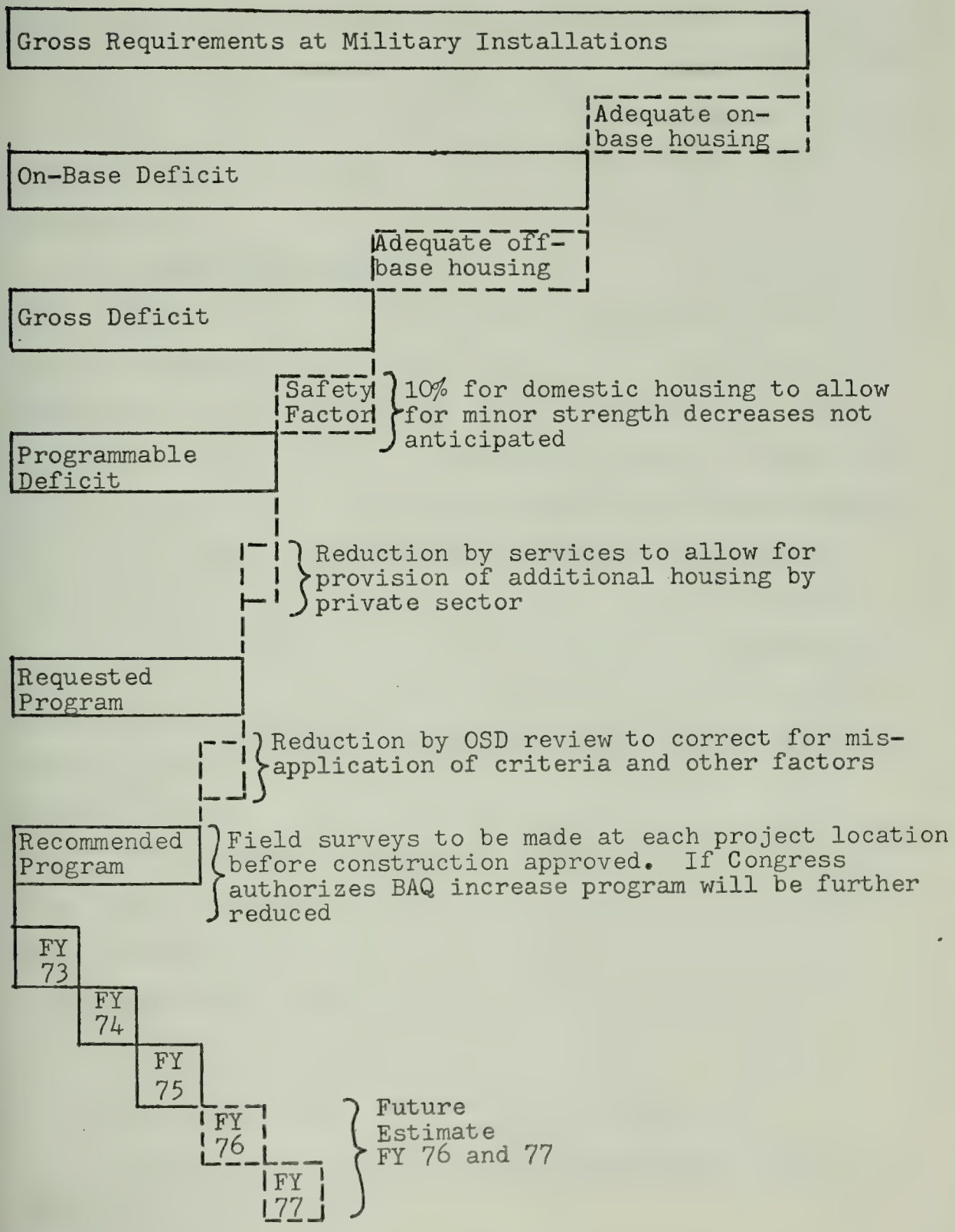
Within the Department of the Navy, the Shore Installation Division (OP-44), of the Office of CNO, is responsible for the actual determination of the Navy's family housing program to be recommended to the Assistant Secretary of the Navy (Installation and Logistics) for submission to the Office of the Secretary of Defense (OSD). The projected program for the four "out-years" is provided annually, based on the data obtained in previous years' surveys.

Funds for new family housing construction are limited. OP-44 finalizes the housing program after receipt of annual survey results and OSD determination of the funding level projected to be acceptable to Congress.

In selecting locations <u>where</u> housing will be programmed, OP-44 first determines the installations having the greatest housing deficit. Other considerations are made, such as unit cost, area cost factors, size of the project, and land acquisition costs. The final project selection for programming is made after balancing needs and average costs per unit. Figure 8 provides a graphic presentation of the procedures described above.

FIGURE 8

DEVELOPMENT OF FAMILY HOUSING PROGRAMS



Within the total new construction dollars available, the average cost per unit for Continental United States (CONUS) family housing construction cannot exceed $30,000 under the FY 1975 housing program criteria.[64] The cost per unit includes, in addition to the basic cost of the unit, site preparation, installation of utilities, design, administration, and contingency.

5. Budget Submission

The Naval Facilities Engineering Command (NAVFAC) prepares the pricing and supporting data, and finalizes the preparation of the Navy Family Housing Program for the CNO and SECNAV, after which it is forwarded to OSD.[65] Upon submission of the Navy Family Housing Program and budget to OSD, it becomes a part of the overall Defense Military Housing Budget, and is further included as part of the President's Annual Budget submission to Congress. For the Congressional review and during the Congressional hearings, each military service defends its own portion of the combined DOD Family Housing Budget.

Following the passage of authorization and appropriation laws, funds are apportioned to the Secretary of Defense. Funds are held at the OSD level until released on a project-by-project basis. Before authorization to advertise a

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[64] Fliakas, P. J., "Family Housing," op. cit., p. 8.

[65] Military Construction Program Management, NAVFAC P-328, op. cit., p. 14-4.

contract for family housing construction is given, the Assistant Secretary of the Navy (Installation and Logistics) must recertify to the Assistant Secretary of Defense (Installation and Logistics) that a current and continuing need for the project exists.[66] A current working estimate, based on the final plans and specifications, is provided for the recertification. Upon approval, funds are released for the stated total maximum amount for each project by the Assistant SECDEF (Comptroller) to the Assistant SECNAV "Financial Management."[67] NAVFAC ultimately receives the funds and reassigns them to the engineering field divisions (EFD's), located geographically within CONUS. The EFD's also have branch offices overseas to handle construction of family housing in these areas. The EFD's then accomplish the construction through competitive bidding and/or negotiated (turnkey) contract.

Figure 9 depicts the complete programming cycle for a typical Navy family housing project.

C. SUMMARY

Management of the Navy Housing Program is but a part of the Department of Defense Family Housing Program. The Commander, Naval Facilities Engineering Command (NAVFAC) manages the Navy Family Housing Program for the Chief of Naval

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[66] Ibid., p. 14-5.

[67] Ibid., p. 14-5.

FIGURE 9

NAVY FAMILY HOUSING CONSTRUCTION CYCLE

YEAR 1	
January-March	Annual survey conducted. Coordinated by District Commandant or Area Coordinator.
April-July	Tabulation of survey data. CNO determines projected base loading. Programmable housing deficits determined at this time. OSD requests HUD (FHA) concurrence in need for proposed updated 5 year program.
August-September	Updated Five Year Program submitted to OSD. Proposed projects in budget year (year 1 program) priced by NAVFAC.
October-December	Budget Submit, including Family Housing Projects (first year), submitted to OSD. Review by OSD, changes to 5 year budget program made by Program Budget Decision.
YEAR 2	
January-March	New housing survey for Year 2. President's Budget submitted. Congressional hearings begin on Year 1 program. Final design begins on projects included in Year 1 budget program.
April-July	Same as Year 1. Congressional hearings continue on Year 1 program.
August-September	Same as Year 1. Congressional hearings continue on Year 1 program.
October-December	Same as Year 1. Authorization and appropriation bills for Year 1 program are passed and signed into law.

FIGURE 9

(CONTINUED)

YEAR 3	
January-February	Same as Year 1. Preparation of bid invitations for Year 1 approved program. Recertification of Year 1 approved projects using Year 2 survey. Concurrence by HUD (FHA) required before bid invitations on Year 1 approved program.
March-May	Same as Year 1. Bid openings and award of contract for Year 1 approved project.
June-December	Construction Year 1 project.
YEAR 4	
January-June	Construction of Year 1 project.
July	Occupancy.

Source: Department of the Navy, Naval Facilities Engineering Command, NAVFAC P-328, Military Construction Program Management, June 1971, p. 14-6, 14-7.

Operations. Assisting NAVFAC in managing family housing assets are its Engineering Field Divisions, Housing Management Centers, and Activity Commanding Officers, supported by their local public works departments and centers. Local commanding officers throughout the naval shore establishment are responsible for operation and maintenance of family housing assets under their command.

The determination of housing requirements is accomplished through the annual family housing survey. From the survey, deficits are identified, and subsequently new housing construction requirements are developed and included in the Navy and Department of Defense Five-year Defense Plan. Navy new construction is then budgeted and included in the President's annual budget submission to Congress. Upon Congressional review, authorization, and final appropriation, funds are distributed on a project basis to the engineering field divisions for construction accomplishment. From inception and submission of a project to final completion and beneficial occupancy, normally takes approximately three years, at best. Housing O&M funds are also distributed through the NAVFAC field divisions/HMC's to the activity commanding officers.

IV. MAJOR HOUSING INVESTMENT DECISIONS

A. CHRONOLOGY OF MAJOR HOUSING DECISIONS

Before a housing unit deteriorates into a marginally adequate condition a prior decision had to be made to construct the unit. In the year that decision was made, it was also decided that the Department of Defense and the Navy would provide additional military owned housing units for its married servicemen and their families. It may then be asked, where does the decision to rehabilitate marginally adequate housing units fit into the scheme of housing decision making?

In order to provide perspective for this question, this chapter will discuss the anatomy of chronological decision-making events leading to the problem discussed by this thesis. In order to structure the anatomy of chronological decision-making events, a decision flow diagram (decision tree) will be used. The decision tree method of analyzing a problem provides a visual depiction of the chronological interaction between the decision alternative at any stage in the dynamic evolution of a program or problem.[68] Again, this problem will be addressed to the domestic military housing program in the United States, as stated in Chapter I.

The first decision-making event, one that must be considered annually, is whether or not to provide additional housing assets

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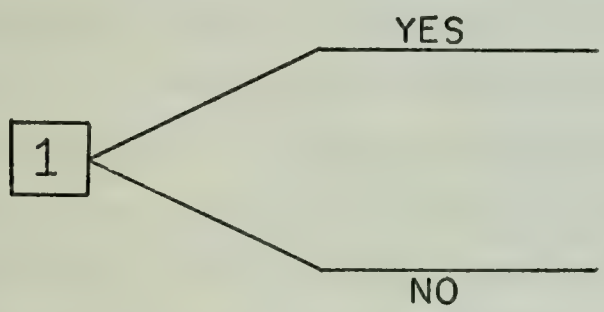
[68] Raiffa, H., Decision Analysis, Addison-Wesley, 1970, p. 127.

to married servicemen. If it is decided to provide additional housing assets, the serviceman occupant must forfeit his basic allowance for quarters (BAQ). The government may elect to instead pay BAQ to the serviceman and leave the provision of housing up to the individual. This decision-making process will be discussed later in this chapter, illustrating some of the current efforts being made in economic analysis as applied to housing investment decision-making, and giving insight into a common problem in public decision-making, that being the determination and quantification of benefits. The first decision-making event can be represented in the decision tree as follows:



[1] decision: provide or not to provide additional military housing assets to married servicemen [69]

If a decision is made to provide housing assets to the military family, then how should the asset be acquired? The alternatives to consider are: (1) construct new military quarters, (2) lease from private housing community, and (3) do both. Applied to the decision tree, these alternatives can be expressed as shown on the following page:

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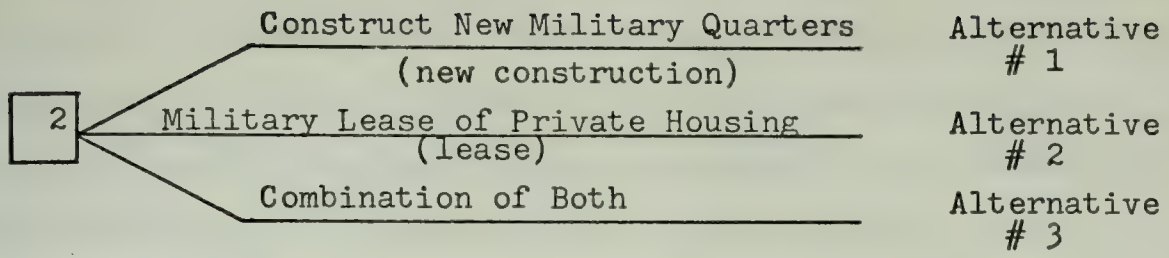
[69] The symbol [ ] means a decision is required.



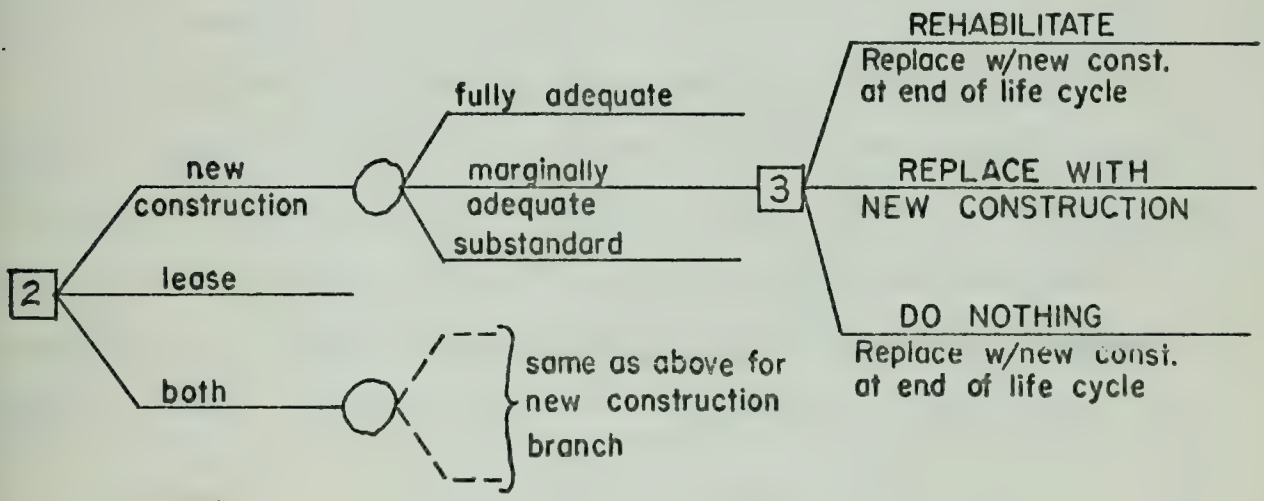
2 decision: How to acquire housing assets

Past decisions have usually been the "combination of both," alternative # 3, with a predominance of new construction over lease.

The DOD policy, supported by Congress, is to utilize the local community to provide adequate housing to service members and their families when it is available. The criteria for adequacy and availability has been discussed in Chapter III. The decision to provide housing is based on lack of adequate, available housing in the local area. If there is a firm, long-range requirement, family housing units are usually provided by new construction. Leasing of housing units normally occurs where there is a short term demand or a small demand, or the installation is in a remote location.

With the use criteria conditions impinging on in-leased housing, the majority of additional housing asset acquisitions (decision 2) have been through new construction. After a new housing asset is acquired through new construction, the next major decision event occurs downstream in time, as the unit ages. The housing unit goes through varying states of nature. More specifically, it begins as a fully adequate housing unit, then becomes marginally adequate, and finally becomes sub-standard and is eliminated from the housing inventory. During

this birth to death cycle, another major decision must be made. The state of nature in which decision-making again becomes critical is when the unit becomes marginally adequate and barely meets habitability standards, which is the concern of this thesis. The state of nature mentioned above and the next decision-making event, is expressed by the following decision tree:[70]



3 decision: What to do with marginally adequate quarters?

Decision 3, in the above portion of the decision tree, defines the decision-making event, "what to do with marginally adequate quarters," and identifies the alternatives open to the housing manager.

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[70]The symbol ◯ indicates a state of nature.

A key and logical assumption throughout the decision tree is that when the Navy decides to build a new housing unit, the requirement is permanent. The decision to fill that requirement by new construction generates a perpetual series of housing unit cycles. Following the birth to death cycle of a given housing unit, another cycle is started by the construction of a new unit. This assumption is valid as long as the Navy continues to replace its deteriorated housing units and increases its total housing inventory.

The segments of the decision tree can be combined, as shown in Figure 10. Figure 10 represents a chronological sequence of decision making events, leading to that of the problem identified by this thesis. The decision tree analysis provides perspective for the housing manager's decision making problem, namely, "what to do with existing marginally adequate quarters?"

B. REVIEW OF DOD FAMILY HOUSING STUDIES

Prior to the submission of the FY 1975 family housing construction program to Congress, the Department of Defense conducted a housing study to answer the first decision activity noted in the preceding section: that is, should additional family housing units be provided to servicemen by the FY 1975 housing program.[71] This study, commonly referred to as the Hix Study, was prompted by the Secretary of Defense FY 75 Program Decision Memoranda which suspended the execution of the FY 75

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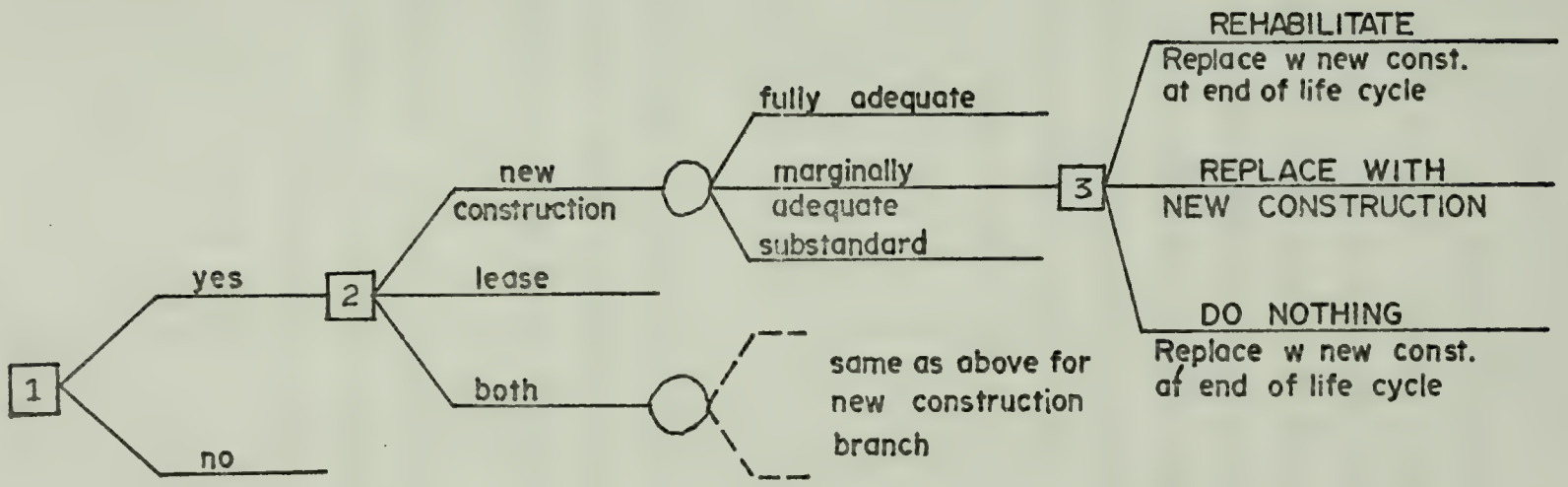
[71] A Study of the Military Family Housing Program, op. cit.

FIGURE 10

CHRONOLOGICAL SEQUENCE OF MAJOR HOUSING DECISION EVENTS



Decision 1	Decision 2	States of Nature	Decision 3
Should Military Service Provide Quarters?	How should new housing assets be acquired?	Over time various states of nature occur.	What to do with existing marginally adequate quarters?

housing program pending a complete study of military housing requirements and alternative means of providing housing.

The Hix Study is being mentioned for several reasons. Besides giving the reader an insight into the latest DOD thinking in answer to the first question of housing managers (to build or not to build), it also illustrates some of the difficulties involved in applying economic analysis in the public arena. Additionally, it identifies key assumptions required in the analysis of long term housing investment decisions.

The study considered only housing in the continental United States (CONUS) which represents about 70% of the total DOD housing inventory. It is interesting to note that, of this amount, 60% is located within thirty miles of cities of at least 250,000 population. The Hix Study explores three alternatives:

Alternative 1: Restrict new housing construction to foreign and U. S. possessions only (1,800 units; $63.6 million). Service personnel in these locations usually have few housing options.

Alternative 2: Restrict new housing construction to foreign and U. S. possessions plus remote CONUS areas (4,750 units; $147 million). Civilian housing alternatives are generally more limited in remote CONUS areas.

Alternative 3: Request the original FY 75 housing program (10,460 units; $337.4 million).

The basic question that the Hix Study tried to answer was whether it was economically superior to construct additional

housing units or not to build new units and, instead, allow servicemen to draw the housing allowance (BAQ). These options will hereinafter be referred to as "new construction versus "BAQ."

The net present value (NPV) economic analysis technique was used to compare new construction versus BAQ. This analytical technique considers the time value of money and life-cycle benefits and costs. The two options were analyzed for the same life-cycle period, eliminating the need for use of uniform equivalent cost method (used for alternatives of differing life-cycles).

1. Key Assumptions Used in DOD Studies

a. Economic Life

In the Hix Study, the NPV analysis was used with the assumption that new construction would have a useable life span of fifty years. The term "useable life" is interpreted to mean economic life, that period of time over which benefits are derived. Since there are many factors involved, such as type of construction, location and level of maintenance, the coordinator of the study was asked how the fifty year economic life was determined? It was learned that the figure was derived from a consensus of Department of Defense personnel comprising long time expertise in the military family housing business.

In a 1968 DOD study concerning alternative methods of financing military family housing, a different life-cycle (economic life) assumption was used. In that study, it was stated:

We assume that a new house must be provided immediately and one continuously made available over a 40 year period. We assume a 40 year useable life for conventional homes with zero residual value. 72

In view of the preceding, the authors will compare alternatives using both 50 and 40 year life-cycle assumptions.

b. Major Mid-Life Rehabilitation

Another key assumption used in the Hix Study was the need for a major rehabilitation at the half-life stage. Assuming a 50 year life cycle, the rehabilitation would be performed at the 25 year point, and at the 20 year point for an assumed 40 year life cycle.

The major mid-life rehabilitation assumption has some strong substantiation in actual practice. The Navy's Wherry housing units are today 19 to 25 years old. Many have been declared substandard or classified as marginally adequate units. Feasibility studies to rehabilitate these units to fully adequate habitability standards have shown the costs to be significant. As an example, one such study to rehabilitate 282 Wherry units at the Marine Corps Supply Center, Barstow, California, was recently completed with the following cost estimates:[73]

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[72]Department of Defense, Alternative Methods of Financing Military Family Housing, 24 July, 1968, p. 51.

[73]Department of the Navy, Naval Facilities Engineering Command, Feasibility Study to Update Family Housing (ESR No. 350101F) Marine Corps Supply Center, Barstow, California, F. Y., 1974, by Mathew Lapota and Associates, A & E, p. 98.

Wherry Housing Rehab Cost Estimate for MCSC, Barstow

Type Unit	Quantity	Unit	Unit Cost	Total Cost
A	10	ea.	$16,462	$ 164,620
A-R	4	ea.	17,434	65,736
B	48	ea.	18,086	868,128
B^1	18	ea.	24,085	433,530
C & C^1	27	ea.	16,842	454,734
D	9	ea.	13,998	125,982
E	18	ea.	18,988	341,784
E^1	3	ea.	22,701	68,103
F	106	ea.	18,865	1,999,690
F^1	22	ea.	18,400	404,800
G	8	ea.	22,015	176,120
H & H^1	8	ea.	16,849	134,792
J	1	ea.	19,979	19,979
			Total	$5,257,998

Family housing rehabilitation is currently limited by law to $15,000 per dwelling unit ($\frac{1}{2}$ of the new construction cost) by the FY 74 Military Construction Authorization Act. This legal limitation is in agreement with DOD's policy that renovation or modernization should not exceed 50% of new construction cost.[74] Since the average rehabilitation cost for the above project exceeds $15,000, the project was not funded.

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[74]U. S. Congress, House, Committee on Appropriations, Military Construction Appropriations for 1973, 92nd Congress, 2nd Session, 1972, Hearings, Subcommittee on Military Construction, p. 185.

The projected need for a major rehabilitation at mid-life generates questions concerning the frequency of major changes in DOD housing habitability standards, and the causes for these changes. The most recent major habitability change included an increase in allowable net floor area, and was incorporated in the FY 74 military housing legislation. This change was initiated by the Secretary of Defense at the urging of the military services and represents the first major change in net area allowances in over thirty years.

The tabulation below shows superceded and current maximum allowable space limitations for family quarters.[73]

Pay Grade	Number of Bedrooms	Previous Net Floor Area (Square feet)	Current Net Floor Area (Square feet)
O-7 and above	4	2,100	2,100
O-6	4	1,670	1,700
O-4 and O-5	4	1,400	1,550
	3	1,400	1,400
O-1 through O-3	5	1,400	1,550
W-1 through W-4	4	1,400	1,450
and	3	1,250	1,350
E-7 through E-9	2	950	950
E-1 through E-6	5	1,400	1,550
	4	1,250	1,350
	3	1,080	1,200
	2	950	950

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[73]Public Law 93-166, 93rd Congress, S 2408, November 29, 1973.

The cause for this change in habitability criteria can be related to the change in family life style and the increased physical area limits of the housing structure. The period from 1950 to 1972 reflected a continuous expansion of domestic elements (TV, freezers, power mowers, larger wardrobes, bed sizes and family/recreation rooms, for example), which in turn generated additional space needs. Other considerations dramatizing the change in family life style are those of land use intensity, (what is now acceptable in terms of population density in today's society), and recreational facilities in and around housing.

If this life style continues to grow, as in the past, accelerated obsolescence may occur. One may conject, however, that society may reorder its priorities and adhere more closely to the status quo, in view of constraints in energy, productivity, financing, and land use availability. If this is true, obsolescence might occur at a lesser rate.

On the practical side, Congress is understandably "first cost" orientated in deciding what is to be incorporated in new housing construction, and this orientation begets built-in obsolescence. Based on reviews of Congressional Hearings and Committee Reports, one would be hard pressed to sell to Congress what might appear as an "overbuilt" housing unit, with features that significantly reduce life-cycle costs and premature obsolescence. One would not only have to have a crystal ball, but prove he had one. Planning and designing for new housing construction then must be sensitive to first

cost acceptability to Congress. Under these circumstances, mid-life rehabilitation appears to be a reasonable assumption.

2. Benefits of Military Housing

An obvious benefit in providing the married serviceman quarters is the BAQ he forfeits when he moves into military quarters. The Hix study also identified four basic benefits that accrue from family housing, as follows:[76]

a. Responsiveness of key personnel living on base.

b. Morale and effectiveness of personnel who are more satisfied due to the availability of government housing.

c. The psychological contract between the Services and its personnel, that the Service "takes care of its own."

d. Increased retention of personnel due to their satisfaction with public quarters.

Understandably, the quantification of these subjective benefits into a dollar measure was one of the major weaknesses of the study. The Navy is currently working on the problem of quantifying military housing benefits through on-going research and analysis efforts at the Navy Personnel Research and Development Center, San Diego, California. Through the use of survey questionnaires and other techniques, the Center is attempting to formulate policy recommendations for Navy housing management that will satisfy the greatest number of requirements. Some of the specific questions being examined in the current study include the following:

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[76]Baker, M. H., "Defense's Need for Sound Analytical Techniques," Commander's Digest, Vol. 16, No. 6, 8 August 1974.

a. What type of person prefers military housing?

b. What affect does military housing have on career retention?

c. Does poor housing cause people to get out of the service?

d. Adequate military quarters might contribute to the married serviceman's being satisfied, but is it enough incentive for him to stay in the service?

Decision making in the past has resulted in the commitment of resources for the construction of new military family housing assets.

C. SUMMARY

The decision concerning what to do with marginally adequate housing assets can be thought of as one major decision event in a series of events which develop throughout the life-cycle of a housing unit. The two preceding major decisions are, should the military provide quarters to its married servicemen; and (if the answer is yes), how should these new assets be acquired?

Analyzing these decisions is no easy matter because of the difficulty in defining and quantifying benefits in the public sector.

In recent DOD studies on family housing, key assumptions have been identified that apply to the economic analysis of the alternatives concerning marginally adequate housing assets. One such assumption is a 40-year economic life for a new Navy housing unit. One study did conflict with this assumption by

using a 50-year economic life. Another key assumption is that at the mid-life cycle (20 years), the housing asset will require a major rehab to again elevate it to full habitability standards and insure realization of full economic life of the housing unit.

V. QUANTITATIVE ANALYSIS OF MARGINALLY ADEQUATE HOUSING ALTERNATIVES

A. SAN DIEGO HOUSING

There are 1,624 units of Wherry housing supporting the Naval Complex at San Diego, California. This housing is located outside the naval base, in two areas containing 812 units each. The older subdivision, Cabrillo Heights, was constructed in 1953. The newer area, Bayview Hills, was constructed in 1954. The older, Cabrillo Heights' units will be used in the analysis. All of the Wherry units are dedicated for use by enlisted personnel.

All Navy housing in the San Diego area is managed by the Public Works Center through their Housing Department. The Public Works Center also provides maintenance and repair support, in addition to utilities support. The Public Works Center is a Naval Industrial Fund Activity which requires full costing as part of its financial management structure, consequently, PWC housing operations and maintenance (O & M) cost reports contain all costs, including overhead and contract charges.

In the case of activity public works supported housing the Housing O & M cost report captures overhead only to the extent of accelerated overhead on direct labor.

B. HOUSING COST REPORTING

Total costs for the management and operation of the family housing program at San Diego, and throughout the Navy, are collected and recorded for inclusion in the NAVFAC managed Family Housing Operation and Maintenance Management Report. This ADP quarterly report provides a summarized cost data base for housing by category (Wherry, Capehart, 70+, and others), and by geographical area.

The Family Housing Operation and Maintenance Management Report is part of the Family Housing Management Information System (FHMIS), which had its beginning in 1971. The FHMIS called for implementation of a new cost reporting requirement for tracking the expenditure of family housing funds by all DOD activities. The purposes of this new reporting system were to: (1) achieve comparability between the services in the reporting of costs; (2) establish more definitive descriptions of functions/services that are to be funded; (3) ensure informational feedback to the activity; and (4) use existing accounting systems with a view towards mechanization of reporting.

The Navy implemented a standard cost collection and reporting system, FHMIS, for its activities in July, 1972. It was not until the implementation of this new reporting system that Wherry units were identified as a separate category;

accordingly, the historical data base has only recently begun generating category consistent cost data. Additional reports are generated from the FHMIS data base. Higher housing management echelons within the Navy receive summarized reports by area of responsibility, (e.g., LANTDIV, PACDIV), and by housing category, for use in funding forecasts, determining utility consumption and rates, for budget purposes, and other top management needs.

Appendix B is a sample activity Family Housing Operations and Maintenance Report. As noted in Appendix B, the collection of costs is comprehensive and all cost categories are identified by line item and cost account code. Figure 11 is an extraction of pertinent cost data from the FY 1974 San Diego Complex O & M Report, with a unit cost comparison between the categories for Wherry housing and public quarters built after 1970 (PQ 70+).

C. BASE YEAR OF ANALYSIS

The ensuing comparison of alternatives will be made as if the decision concerning marginally adequate quarters was to be incorporated in the FY 76 Family Housing Construction Program. This means that a new housing construction project or an improvement project to rehabilitate marginally adequate units, because of anticipated Congressional approval lapsed time and construction lapsed time, would not start drawing benefits until July 1977. All the alternatives will then collectively begin to generate benefits at the same time.

FIGURE 11

PERTINENT DATA FROM SAN DIEGO HOUSING OPERATIONS
AND MAINTENANCE MANAGEMENT COST REPORT
PERIOD ENDING 30 JUNE 1974

Wherry Housing

Number of units - 1,620

Operation and maintenance costs per unit - $1,375.30

Operation and maintenance costs per thousand square feet $1,063.08

Public Quarters Built After 1970

Number of units - 1,496*

Operation and maintenance costs per unit - $511.04 uncorrected

Operation and maintenance costs per thousand square feet $609.73 uncorrected

*Many of these units were under construction during FY 73. The figure 1,496 represents actual number at the end of the reporting period. The average number of units in the inventory during 1974 was 1,067. PQ 70+ corrected operation and maintenance costs, per unit and per square foot are as follows:

Operation and maintenance costs per unit - $772.60 corrected

Operation and maintenance costs per thousand square feet $854.90 corrected

Accordingly, the base year for the analysis will be calendar year 1977.

During the current high inflationary period, DOD is using a 6% inflation factor for estimating the cost of new construction.[77] Projecting the FY 75 proposed average unit cost limitation of $30,000, the FY 76 housing program, which would commence drawing occupancy benefits in 1977, will cost an average of $31,800 per unit.

In comparing Fiscal Year 1973 and 1974 O & M costs for Wherry housing in San Diego, a yearly increase of 6% in operation and maintenance costs was also noted. Projecting O & M costs for the base year 1977, using actual FY 1974 figures and a 6% inflation factor, yields an increase for operation and maintenance costs by a factor of 1.19.

After 1977, a 3% inflation rate is used, which is incorporated in the 10 percent discount rate. A 10 percent discount rate is required for all DOD and Department of the Navy economic analyses. As noted in Appendix A, the 10 percent discount rate for real property is actually a joint discount/inflation rate composed of a 7 percent discount rate and a 3 percent inflationary deflator factor. It can be reasoned, with the current emphasis on controlling inflation, that by 1977 the inflation impact will be closer to a more normal annual rate of 3%. A 3% inflation rate is recommended for material, labor

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[77] Fliakas, P. J., "Adequate Housing - A Morale Factor of Prime Importance," op. cit., p. 3.

and electrical utilities costs, which constitute the vast majority of O & M housing costs.[78]

D. UNIFORM ANNUAL COST

When comparing alternatives with different economic lives, three techniques of economic analysis are frequently used:

1. Replacement chains
2. Salvage value at end of shortest life
3. Uniform annual cost (UAC)

All three of these methods consider the time value of money and permit life-cycle costs to be included in the analysis. A detailed discussion of the principles of economic analysis, including the concept of the time value of money, and the technique of economic analysis (with practical examples) is included in Appendix A.

The DOD and the Department of the Navy recognize the uniform annual cost method of analysis (sometimes called equivalent annual cost) for comparing alternatives with different life-cycles; therefore, this economic analysis technique will be used to analyze and rank the alternatives. In this analysis, the alternative with the lowest UAC is the superior alternative.

E. LIFE CYCLE OPERATION AND MAINTENANCE COSTS

The data base for compiling life cycle operation and maintenance costs by housing category has only recently been implemented, with the FY 1973 version of the Family Housing

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[78]Department of the Navy, Naval Facilities Engineering Command, NAVFAC Instruction 4100.6, Shore Facilities Energy Conservation Survey Program, 29 March 1974, Enclosure 7, p. 2.

Operation and Maintenance Management Report. Development of a life cycle operation and maintenance cost projection is somewhat difficult and has previously been handled in various ways within the DOD community. In the Hix Study, previously referenced, O & M costs were treated as a constant and uniform cost throughout the life cycle of the housing asset. Conversely, the 1968 Family Housing Study assumed the operation and maintenance costs of a new housing unit to be 80% of that expected for an "old" unit.[79]

The cost data in Figure 11 corroborates the statement above reflecting operation and maintenance costs of a new unit to be approximately 80% of that for an "old" unit. The PQ 70+ housing category represents the most recently constructed quarters in the Navy's inventory. A comparison of the two categories from the FY 1974 San Diego O & M cost report reveals the per square foot costs for PQ 70+ to be approximately 80% of the O & M per square foot costs for the older Wherry units.

When is a unit considered "old"? For planning, budgeting and controlling of operation and maintenance costs, the housing manager at San Diego states that the operation and maintenance costs, although initially lower for new units, reach a steady state at about the seventh year of the unit's life. Pictorally, this can be represented as follows:

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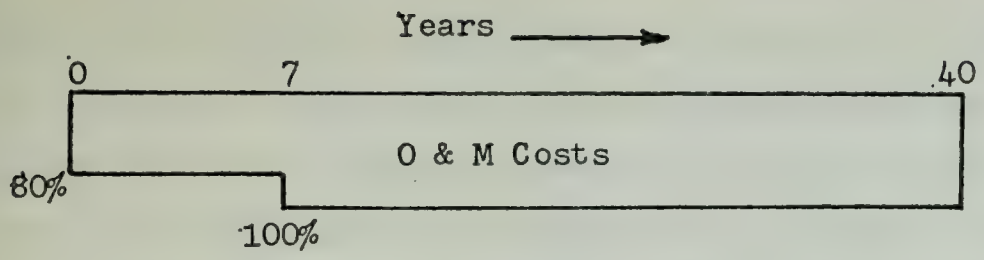
[79] Alternative Methods of Financing Military Family Housing, op. cit., p. 55.

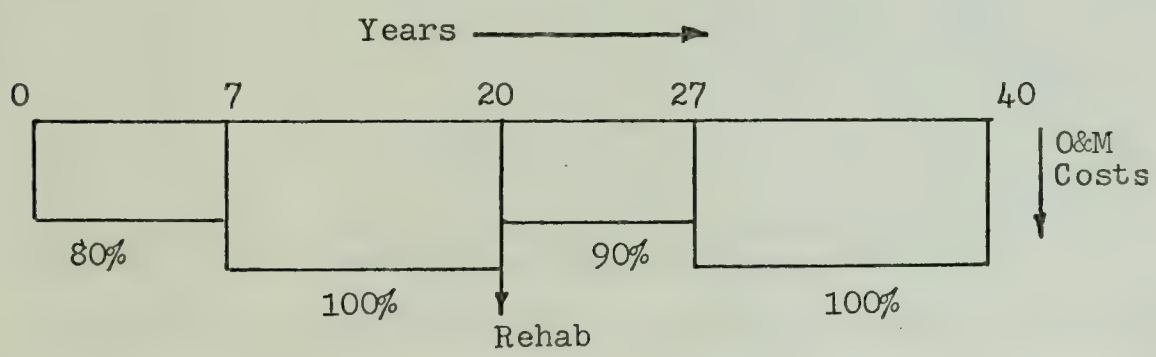


An investigation was then made concerning the affect on O & M costs for a housing unit after completion of a major rehabilitation at the half-life point. A secondary benefit expected of a rehabilitation or a major improvement project is the reduction of operation and maintenance costs. In order to verify this point, a questionnaire (see Appendix C) was forwarded to the Housing Directors of the four Navy Housing Management Centers, for feedback. Collectively, these officials comprise many years of practical experience and expertise in Navy housing management; a portion of their function encompasses the management and review of operation and maintenance costs for all Navy family housing assets.

One of the questions posed to the directors was whether the operation and maintenance costs of a newly rehabilitated unit of formerly marginally adequate quarters at the mid-life cycle would be reduced to that of new construction, would remain the same, or be somewhere in between. The consensus of the directors was that operation and maintenance costs would be reduced. Two respondents projected the operation and maintenance costs to be reduced to a level expected of new construction, and the remaining respondents projected the reduction of operation and maintenance costs to a level somewhere between that of new construction and "remain the same," depending upon

the scope of work accomplished. For example, the rehabilitation of the kitchen, bath, and other areas with new modernized components would result in reduced maintenance costs; however, the installation of an air conditioning system, dishwasher, and garbage disposal would bring about increased O & M costs. The San Diego Housing Officer, when asked to complete the questionnaire, expressed the view that operation and maintenance costs would be reduced to a level somewhere between that of new construction and the level experienced before rehabilitation was performed on the unit.

Assuming the secondary benefit of the rehabilitation project is realized, and taking into consideration the experienced views of the questionnaire respondents, a 10% reduction in operation and maintenance costs is projected for the seven year period following the performance of a major rehabilitation project. The life cycle operation and maintenance cost profile is then:



F. ALTERNATIVE 1: REPLACE MARGINALLY ADEQUATE QUARTERS WITH NEW CONSTRUCTION

1. Assumptions

Economic life: 40 years

Joint discount/inflation rate: 10%

Salvage value: 0

2. Costs

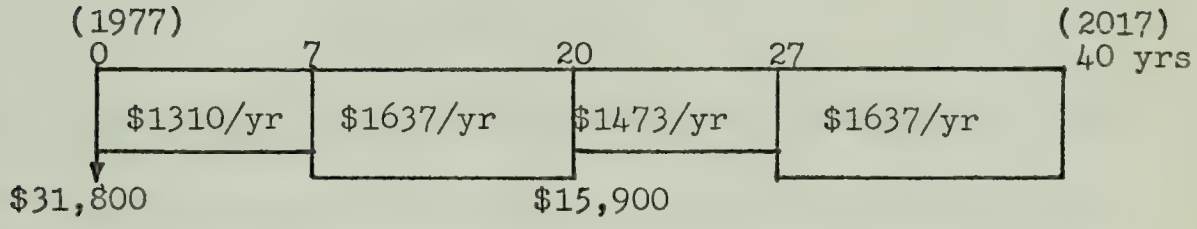
Constant dollar costs: base year 1977

New construction costs: $31,800

Mid-life rehabilitation costs ($\frac{1}{2}$ of 31,800) = $15,900

Life cycle operation and maintenance costs:

New Construction
Life-Cycle Costs



$$\text{Uniform annual cost (UAC)} = \frac{\text{net present value costs}}{\text{sum of present value factors}}$$

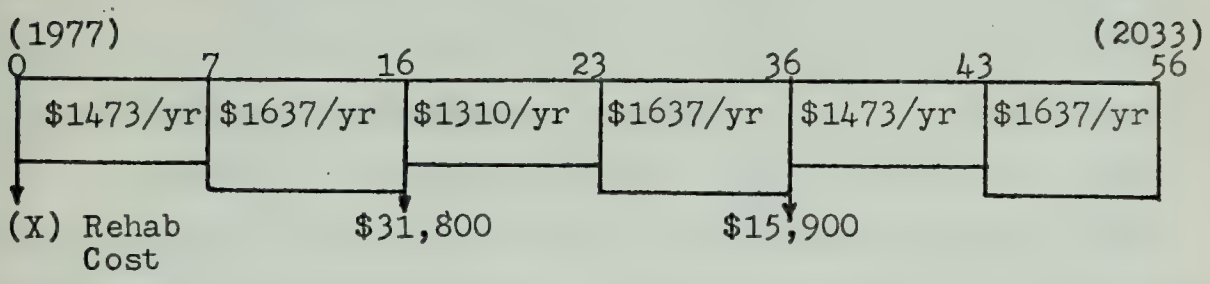
$$\underline{\underline{\text{UAC} = \$4,801}}$$

G. ALTERNATIVE 2: REHABILITATE EXISTING MARGINALLY ADEQUATE QUARTERS, BUILD NEW QUARTERS AT END OF LIFE-CYCLE

The objective of rehabilitating marginally adequate quarters is not to extend its life but rather to realize its full life-cycle potential. Conversely, if a unit of marginally adequate quarters was not rehabilitated, one would expect the unit's projected economic life to be decreased. This latter alternative will be discussed in the following section.

Assumptions applied are the same as those listed for the new construction alternative (Alternative 1).

Rehabilitation Life Cycle Costs
Cabrillo Heights



Applying the DOD policy for family housing rehabilitation cost limitations, rehabilitation cost should not exceed one/half the cost of new construction. (X) Rehab cost is then $15,900, and the uniform annual cost (UAC) is:

UAC = $3,784

H. ALTERNATIVE 3: DO NOTHING, BUILD NEW QUARTERS AT END OF LIFE-CYCLE

The uncertainty surrounding this alternative concerns itself with the length of time an existing marginally adequate unit will remain in that status before it falls into the inadequate status and is designated substandard. It should be noted that often when a unit is declared substandard, it is not demolished, but instead retained in the inventory. Military members are allowed to live in substandard units; however, they do not forfeit their entire housing allowance. Substandard housing may be operated and maintained providing the total costs do not exceed BAQ forfeitures from the occupants. It is Navy policy to eliminate substandard quarters as promptly

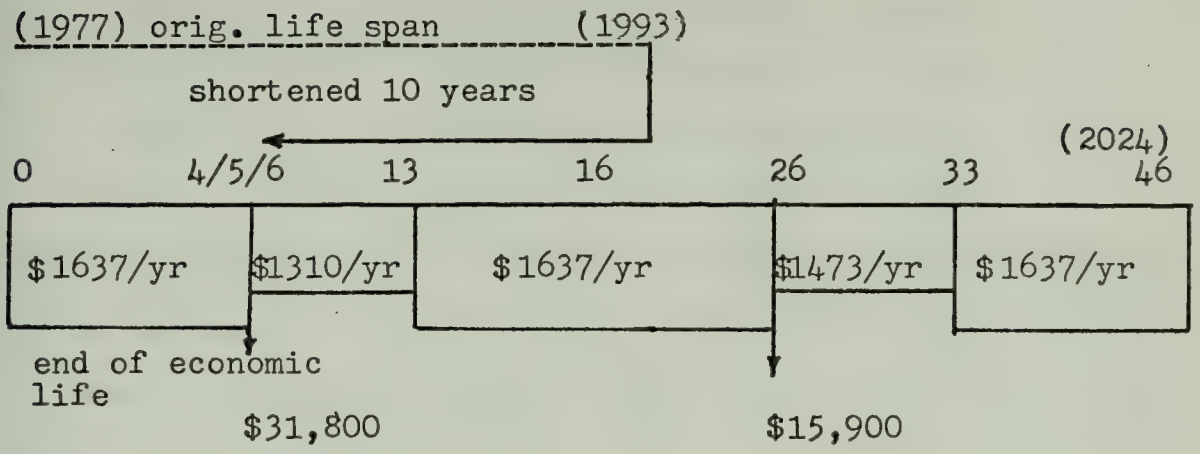
as possible, if this can be done without imposing unreasonable inequity and hardship upon naval personnel.

For this alternative, it is assumed that a replacement unit is programmed and constructed as a replacement for the existing marginally adequate unit at the time it is declared substandard or inadequate.

In order to gain some insight into the question of when a marginally adequate unit will become inadequate (and ultimately declared substandard), professional views were solicited from the directors of Housing Management Centers. Assuming a group of 20 year old marginally adequate Wherry units would have a remaining economic life of 20 years if a major rehabilitation project were performed, the directors were asked by how many years the economic life would be shortened if the rehabilitation was not performed. Three out of the four directors felt that the life of the existing marginally adequate housing assets would be reduced by 10 years. The fourth director projected the life to be reduced by 3-5 years. The directors were divided on whether the reduction in economic life would be primarily caused by an upgrading of habitability standards or by a combination of upgraded habitability standards and a physical degeneration of the units.

In comparing the UAC of this alternative with those of the previous two alternatives, a 10 year decrease in economic life will be assumed. The life-cycle costs of this alternative applied to the Cabrillo Heights subdivision yields the following:

Do Nothing Life Cycle Costs
Cabrillo Heights



In doing nothing; assuming the economic life will be reduced by 10 years, the uniform annual cost becomes:

UAC = $3,481

This uniform annual cost as compared to the other alternatives is shown below:

San Diego Cabrillo Heights Wherry Units

Alternative	Uniform Annual Cost
1. Replace with new construction	$4,801
2. Rehabilitation	$3,784
3. Do Nothing	$3,481 (life reduced 10 years)

From the above comparison, the do nothing alternative is superior. Assuming the economic life for the do nothing option is decreased more than 10 years, the rehabilitation alternative becomes the most feasible alternative:

Do Nothing Alternative

UAC = $3,481 (economic life reduced 10 years)

UAC = $3,671 (economic life reduced 11 years)

UAC = $3,784 (Rehabilitation Alternative

UAC = $3,878 (economic life reduced 12 years

The remaining economic life of a marginally adequate housing asset is then a critical variable in determining the ranking of alternatives, particularly between the do nothing alternative and the rehabilitation alternative. The ranking of the alternatives as a function of the remaining economic life is shown in Figure 12.

As can be seen from Figure 12, the competing alternatives are the rehabilitation and the do nothing options. As the reduction of remaining economic life decreases beyond 11 years in the San Diego case for the do nothing option, the rehabilitation option becomes superior. In this situation, not only is the rehabilitation option superior, but it appears it would maintain its superiority even if the cost to rehabilitate was greater than the DOD 50% of new construction cost limitation. In these situations, perhaps the 50% of new construction cost limitation should be waived to 60 or 65% with supporting calculations to prove its cost effectiveness.

What does the above analysis reveal to the housing managers? The following strategy is proposed utilizing the preceding analysis:

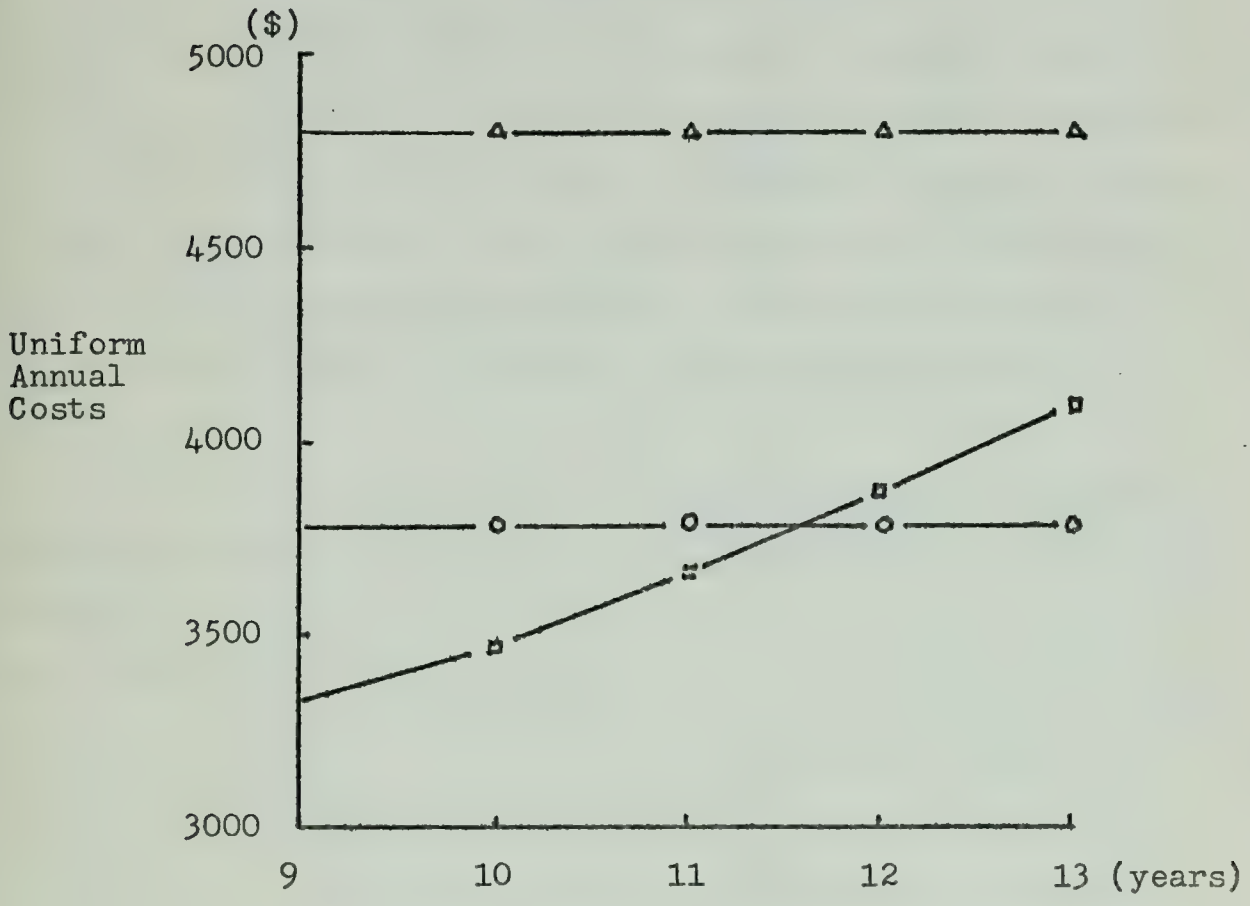
1. If the Cabrillo Heights Wherry units can be maintained in their marginally adequate status until calendar year 1982,

FIGURE 12

GRAPH OF UNIFORM ANNUAL COSTS

versus

REDUCTION OF REMAINING ECONOMIC LIFE



with no significant increase in maintenance cost levels, then "do nothing" is the superior alternative.

Replacement for these units should be included in the FY 1981 housing program.

2. If marginally adequate status continuation with deferral of MILCON cannot be carried out, a rehabilitation should be performed, not to exceed a per unit cost of $15,900. The problem here is to be able to elevate the units to a full habitability standard within rehabilitation cost limitations, and to provide reasonable assurance for the economic life to be sustained until 1993 without failing into inadequate status.

3. If the rehabilitation strategy cannot be carried out within the $15,900 limit the UAC for the "rehab" alternative with its estimated economic life must be recompared with the UAC of the "do nothing" alternative and its estimated remaining economic life; the lower UAC being the superior choice. The alternative of replacing the units with new construction now appears to be a nonfeasible choice as long as the units can be maintained for one more year in its marginally adequate status.

The three alternatives were again analyzed while assuming an economic life of 50 years for a new housing unit. The ranking obtained yielded the following:

Alternative	Uniform Annual Cost
New construction	$4,674
Rehabilitation	$3,339
Do Nothing	$3,420 (life reduced 10 years)

Again, the alternatives of "rehabilitation" and "do nothing" were competing for the position of superior alternative with the rehab option being the winner. The "do nothing" alternative is a close second. Using an assumption of a nine year reduction in the original economic life, the do nothing alternative becomes the superior alternative:

Rehabilitation	UAC = $3,339
Do Nothing	UAC = $3,257 (life reduced 9 years)

I. SUMMARY

In the practical problem for San Diego, the analysis points out that rehabilitating the marginally adequate Cabrillo Heights Wherry units is equivalent to the "do nothing" alternative, if the existing units can remain in their present marginally adequate status for 8 to 9 more years. The critical factors that determine which of these two alternatives is superior are the assumptions concerning the economic life for a new housing unit and the estimation of the remaining life of a marginally adequate housing unit when applied to the "do nothing" alternative. The new construction alternative is always inferior, unless marginally adequate units are immediately declared substandard.

VI. NON-QUANTIFIABLE FACTORS IMPACTING ON HOUSING ALTERNATIVE SELECTION

A. POLITICAL AND STRATEGIC FACTORS

Realistically, decision making in military family housing is often accomplished in the political/strategic arena, and in the context of the problem analyzed by this thesis, political/strategic considerations cannot be ignored. DOD annually battles with Congress for new housing construction funds, and monies to operate and maintain the housing program. Political tugs-of-war are often experienced between individual Congressmen, and between DOD and Congress in determining the average dollar amount to be spent for procurement of the military housing units, whether new construction and/or rehabilitation will be emphasized, the method for financing new housing, and even the contracting method (turnkey or design-bid-built).

When the civilian housing market was experiencing a boom in the late 1960's and early 1970's, housing habitability standards were expanded rapidly. As a result, in FY 1974 a major habitability criteria expansion for military family housing was brought about.

A decision to declare a marginally adequate housing unit to be substandard may be considered, in part, a strategic decision. The prevailing military strategy in the late 1960's and early 1970's was to declare these units substandard, if at all possible, paving the way for replacement by new construction. With active civilian home building programs in

being, the difficulty for military members in competing in the housing market was reduced. Base closures and a decreasing military force additionally supported this to be an ideal time to purge the military inventory of the older and least economically desirable housing assets.

Today, the housing availability environment is reversed. With the contraction of military housing market demands, financing becoming difficult and expensive, and inflationary pressures increasing costs, even substandard quarters begin to look attractive. One Navy housing manager cited a reversal in previous strategy to declare marginally adequate quarters substandard. He noted that with the existing civilian housing being in great demand and rental costs soaring, to declare marginally adequate assets substandard would create undue hardships for the married serviceman. The manager would additionally face the prospect of losing housing assets, and perhaps inadvertently increase the demand within the private housing market. This is a real consideration for the Navy housing manager today, in managing marginally adequate housing units.

B. THE HUMAN FACTOR

Another non-quantifiable factor considered in making decisions concerning marginally adequate housing assets is the human element. The human element is involved in all military housing decisions. Recognizing this fact, and as mentioned earlier, the Navy is currently conducting studies concerning the married serviceman and his family as relating

to housing environment. One such study is currently being conducted by the Naval Personnel Research and Development Laboratory in San Diego, California.

A major concern of the study is in the area of human preferences and behavior in the Navy housing environment. Using the civilian population as a basis for comparison, the study will also consider these influences in setting trends and behavior patterns.

The many complex issues involved in the field of human behavior within the context of the housing environment are beyond the scope of this thesis; however, a few of the issues are listed below:

1. How does the physical environment of Navy family housing promote or discourage certain types of behavior?

2. How does local topography, site planning, and the distribution of neighborhood resources regulate not only the way people feel about space, but also the way they use it?

3. What are the real effects of population density on the desire to stay in the service?

4. What effects do spatial enclosures have, in the design of Navy quarters, in instilling a sense of belonging and identification?

5. What effects do shared facilities (i.e., parking and laundry facilities) and territorial limits (fences) have on housing and community design within the Navy?[80]

The expertise of social scientists is required to analyze these issues, link them to the more generalized knowledge of human behavior, and make effective predictions and recommendations for future military family housing programs.

What does this all mean to the Navy housing manager, who must decide how to manage marginally adequate housing units?

The benefits received by a Navy housing occupant are realized only if that occupant perceives them as such. What is perhaps more important is the influence housing benefits have in encouraging or discouraging a Navy housing occupant to stay in the service.

An economic analysis may favor the rehabilitation alternative, yet it may be virtually impossible, in view of the statutory cost limitation, to rehabilitate a set of marginally adequate quarters to satisfactorially derive viable benefits for the occupant. Leaving the marginally adequate unit as is, (short of meeting all habitability criteria), may be unacceptable psychologically to a married serviceman and his family. Likewise, if new construction design is not in tune with society's perceived life style, difficulty will be experienced

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[80]Department of the Navy, Naval Personnel Research and Development Laboratory, Occupant Opinion of Navy Family Housing: A Study of the Livability and Attractiveness of Navy Family Dwellings, Environment and Services, Washington Navy Yard, Washington, D. C., January 1973, p. 16-18.

in attracting and retaining qualified military personnel. In all phases of housing operations, these considerations are critical, particularly today, in the era of the all volunteer service and because of the recent impetus placed on the enhancement of military life by the former CNO, Admiral Zumwalt.

C. SUMMARY

The decision to do nothing, rehabilitate, or replace with new construction, must not only consider current habitability standards but also the number and condition of existing assets. Design features for rehabilitation and for new construction must include those items which the occupant really values as benefits. Housing decision-makers also must not only consider contemporary needs and standards, but try to anticipate the direction and magnitude of future housing occupant value changes. To do this requires a consideration of asthetic values, a look at society as it really is, and an understanding of life styles. The Naval Personnel Research and Development Laboratory is attempting to clarify and rank the importance of some of these issues. The housing manager should also consider these subjective issues in deciding on the selection of an alternative. Successful housing planning and execution will enhance the quality and effectiveness of the Naval Service.

VII. SUMMARY AND CONCLUSIONS

The authors have endeavored to develop, from the housing manager's point of view, a better understanding of economic analysis as applying to DOD and the Navy, and discuss its utilization as an aid in making long range housing investment decisions. Economic analysis was applied in the examination of alternatives, after the development of decision making criteria. Life-cycle costs and the time value of money were considered in the analysis. The present value analysis technique of Uniform Annual Costs was specifically used to compare the alternatives defined, those being: (1) replace with new construction, (2) rehabilitate existing assets, and (3) do nothing. The housing manager's decision concerning marginally adequate housing assets was placed within a framework of other major housing decisions occurring in the life cycle of a housing unit and involving the long term commitment of resources. These major housing decision events were placed in a chronological sequence according to time of occurrence.

The marginally adequate Wherry housing units supporting the Naval Complex at San Diego were studied, and a strategy developed for disposition of these assets using the results of the economic analysis as a guide. The non-quantifiable factors were also discussed, as were their respective impacts on available alternatives.

A concerted effort was made to rely on available substantiated information to the extent possible, thus minimizing

the number of assumptions required for the analysis. Some difficulty was encountered in the observed variation concerning the economic life of a housing asset, as addressed in several different DOD studies, and in observed inconsistencies for application of the appropriate discount rate.

During the research phase of this thesis, the authors made several observations. Economic analysis as an aid to decision-making is being done at the highest housing management levels within the Department of the Navy and DOD, but at a modest pace and with little application to major decision events concerning existing Navy housing assets. Decision-making concerning existing housing assets, in most instances, is based on initial investment costs with little attention being directed to the examination of all feasible alternatives. Considerations for the non-quantifiable factors that impact on the housing manager, as defined in the preceding chapter, are now receiving some of the attention they deserve. These non-quantifiable factors are real considerations for the housing manager today and appear to be a good topic for further thesis research.

In conclusion, several recommendations are made concerning the management of Navy housing assets. Navy housing management should examine and define all major decision events that occur at the various times in the life of a housing asset. These major decision events, once defined, should be analyzed to determine the feasible alternatives available at the time of decision-making. Economic analysis techniques should then be applied to these alternatives for ranking and to aid the

manager in choosing the superior alternative. In this regard, management should try to identify, if possible, the economic life over which housing units should be evaluated (40 or 50 years). There may be many minor housing decision-making problems, that lend themselves to analysis techniques, that perhaps need to be explored by Navy housing management. Additional research also needs to be done to understand the impact of the non-quantifiable factors on Navy housing management and decision-making.

To be effective, the above recommendations need to be examined by top management and conclusions published to aid in the technology transfer of housing management techniques throughout the Navy. It is the authors' hope that this thesis will provide some of the tools and impetus to accomplish these recommendations. It is felt that the model developed in this thesis is most applicable to resource managers today and should be used by housing managers for decision making concerning their marginally adequate housing assets.

APPENDIX A

ECONOMIC ANALYSIS AND NAVY HOUSING INVESTMENT DECISIONS

A. ECONOMIC ANALYSIS IN THE DEPARTMENT OF DEFENSE

Economic analysis is a manager's tool used to analyze available investment proposals or alternatives facing the decision-maker, and assists him in ranking these alternatives in some order of attractiveness. The essence of economic analysis is the comparison of investment costs and benefits between alternatives. Most analyses involve a comparison of several proposals, or alternatives, as dictated by the number of viable choices available to the manager. In addition, most alternatives involve the expenditure of resources in the future, adding to the complexity of economic analysis.

Economic analysis, as an aid to decision-making, has gained increasingly wide-spread support within the Department of Defense in recent years. At the May 1974 symposium of the Defense Economic Analysis Council (DEAC), the Assistant Secretary of Defense (Comptroller) stated to the military services and the Department of Defense attendees:

> I want to emphasize to you the urgent need for improved and expanded Economic Analysis and Program Evaluation in DOD. To measure up to the public's expectation, it is essential that action be preceded by analysis and that objective and performance be adequately evaluated and explained. In DOD, you hold the key to progress in this regard. Analysis is the key to progress. [81]

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[81] McClary, T. E., "Why DOD Needs Improved Economic Analysis," Commander's Digest, Vol. 16, no. 6, 8 August 1974, p. 2.

In speaking to the DEAC, the Assistant Secretary of Defense (Comptroller) was, in essence, talking directly to the military services. This can be realized by exploring the function of the DEAC.

The Defense Economic Analysis Council was established in 1970 to encourage a Department of Defense (DOD) wide implementation of economic analysis. Its function is to advise the Assistant Secretary of Defense (Comptroller), the Military departments, and other Defense agencies on economic analysis policies and procedures. It additionally advises and directs, through DOD instructions and publications, the methods by which the above departments and agencies can apply economic analysis in their planning, programming and budgeting system and in supporting the decision-making process for managers. Besides supporting educational programs that foster an understanding of economic analysis techniques to both managers and operational personnel in DOD and the military services, the DEAC is also concerned with reviewing and standardizing techniques and methodology of economic analysis in justifying resource allocation decisions.[82] The influence of the DEAC can be traced in recent economic analysis policies of the Department of Defense and the Department of the Navy.

In developing and justifying resource requirements, the Department of Defense requires an economic analysis for proposals, which include a choice (trade-off) between two or more

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[82]Seidel, I. L., "DOD-Wide Economic Analysis Encouraged," Commander's Digest, Vol. 16, no. 6, 8 August 1974, p. 5.

options or alternatives.[83] This requirement is valid even if one of the alternatives is to maintain status quo or do nothing. At the Secretary of the Navy level, within the Department of Defense, the policy requires the use of economic analysis as an aid to management decision-making. Critical assumptions and considerations must be identified for the analysis to be reviewed for creditability.[84]

Since the Department of Defense has placed renewed emphasis on economic analysis justification for resource allocation, the Navy has redefined the role for economic analysis in decision-making. Directives from the Chief of Naval Operations (CNO) call for an economic analysis to be used as an aid to making decisions at all decision-making levels within the Department of the Navy. In addition, the CNO requires an economic analysis to be used to support budget justifications, as a part of the Navy's programming process and as a part of the Navy's support of program objectives.[85]

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[83]Department of Defense, DOD Instruction 7041.3, Economic Analysis and Program Evaluation for Resource Management, 18 October 1972, p. 3.

[84]Department of the Navy, Office of the Secretary, SECNAV Instruction 7000.14A, Economic Analysis and Program Evaluation for Navy Resource Management, 14 March 1973, p. 1.

[85]Chief of Naval Operations, OPNAV Instruction 7000.18, Economic Analysis and Program Evaluation for Navy Resource Management, 27 July 1973, p. 1.

Navy policy further defines economic analysis to be an integral part of the Navy facilities planning process.[86]

The purpose of economic analysis in the facilities planning process is to portray accurate costs of all reasonable alternatives. When an economic analysis favors a particular military construction investment alternative, the analysis itself also provides the required justification to be considered by Congress.

B. IMPLEMENTATION OF ECONOMIC ANALYSIS

As noted in Chapter I, the authors found the use of economic analysis in housing decision-making to be limited, particularly with respect to consideration for the time value of money, which will be discussed below. Feasibility studies to rehabilitate marginally adequate military family quarters, via major improvement projects, are judged on the basis of initial investment cost. Congress re-establishes yearly, an upper ceiling on average improvement costs per housing unit to reflect market cost conditions. The current average cost ceiling on family housing improvement projects is $15,000 per unit.[87] Many of the people contacted during the research phase of this thesis also showed limited knowledge of familiarity with the language of economic analysis.

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[86]Department of the Navy, Naval Facilities Engineering Command, NAVFAC Instruction 11010.53A, Economic Analysis of Proposed Military Engineering Construction Investments, 30 October 1972, p. 2

[87]Fiscal Year 1974 Military Construction Act

This was particularly the case at the lower management echelons, at operating levels, and to some extent at higher levels.

The lack of use of economic analysis at the operating level appears to be DOD-wide. The Defense Economic Analysis Council acknowledges only modest success in its program to increase the use of economic analysis. Preliminary reports from the DEAC's surveys indicate major projects have been subject to analysis, but thousands of managers at the operating level are not using it.[88]

There currently appears to be a technology transfer taking place within the Department of Defense concerning the education and use of economic analysis. In addition to the Department of Defense and Navy Instructions previously referenced, there are numerous other governmental publications, guides, and handbooks published concerning economic analysis. Most military schools offer or require a course in this area. A Pentagon over-view briefing on the subject of economic analysis and program evaluation is given to flag and general officers of all the military services. Training films and video tapes are being produced, some of which are presently available for distribution within the Department of Defense and the military services.

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[88]McClary, T. E., "The Defense Economic Analysis Council," Commander's Digest, Vol. 15, No. 1, 3 January 1974, p. 1.

C. LONG TERM RESOURCE INVESTMENTS

Long term investment decisions, like those typically required in housing, involve commitments of capital for long periods of time. Once made, such decisions ordinarily cannot be reversed without a significant loss in invested capital. The critical element in long term investment decisions is time. The time factor introduces the element of interest into the investment decision. The commitment of capital for long periods entails an interest cost too large to be ignored and is the critical difference between economic analysis of a long term investment decision as compared to a short term investment decision.[89]

An investment decision in housing will normally require some initial case outlay or amount invested. Throughout the life of the investment occur cash flows, both receipts and outlays, that are directly traceable to that investment, and must also be analyzed in making the investment decision. One of the problems incurred in analyzing an investment decision is that of expressing cash flows that occur at various times into a common time dimension. Mathematically, any point in time might be chosen. Logically, the best choice is that point in time at which the decision must be made, that is,

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[89] Fremgen, J. M., Accounting for Managerial Analysis, revised edition, Irwin, Inc., 1972, p. 380.

the present time. Cash flows would then be stated in terms of their present value (i.e., time zero).

The process of converting future cash flows to their present value, by use of an interest rate, is called discounting. The interest rate used in discounting is often called the discount rate. The resultant is a present value, or present worth, of all cash flows that occur during the economic life of an investment. Discounting future cash flows to their present values is a key analytical technique used in economic analysis that properly recognizes the time value of money. Any valid method of analysis for purposes of making long term investment decisions, as in housing, must recognize the time value of money.[90]

Present value analysis is based on the fact that money can earn interest through profit-making capital investments. In the private sector, this creates a large demand for present funds and capital demanders are willing to pay for the limited supply that is available. If a private firm can invest capital funds to obtain 8% to 10% return a year, then $100 today is equivalent to $108 or $110 a year from now. The government is in an analogous position.[91] Tax income dollars today have more buying power today than they will a year from now. In other words, $110 of taxes received next year is equivalent to $100 received this year at 10% discount rate.

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[90] Ibid., p. 388.

[91] Hitch, C. J. and McKean, R. N., The Economics of Defense in the Nuclear Age, Atheneum, New York, 1973, p. 207.

If the private sector can return 8% to 10% on a capital investment decision, then the taxpayer could rightfully claim that his government should not undertake projects earning less than this return. In other words, if the private sector must take this into consideration in evaluating investment opportunities, then the public sector should be under no less an obligation or concern, since tax dollars take this investment opportunity away from the private sector. A lesser return would, in effect, be a misallocation of economic resources. This view must, of course, be tempered by the recognition that many government programs are undertaken for reasons other than the promotion of economic efficiency, such as national defense, social and cultural amenities.[92] In these instances, perhaps putting the project up for public vote is a good way to evaluate its merit; however, this is impractical.

Military family housing investment decisions appear to be closely aligned to the private sector. The objective of family housing, providing a decent home and suitable living environment, can be and is largely supported by the private sector of the economy. Approximately 75% of today's family housing requirements are supplied by the private sector.[93]

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[92] Taylor, G., Use of Present-Value Techniques in the Analysis of Public Expenditures, Curriculum for Economic Analysis Course, Naval Civil Engineer Corps Officer School, June 1974, p. 271-4 (1 of 5).

[93] A Study of the Military Family Housing Program, op. cit., p. iii.

In summary, present value analysis, which takes into consideration the time value of money, is appropriate for military family housing investments. The next obvious question is, "What interest or discount rate should be used in the present value analysis?"

D. CHOICE OF A DISCOUNT RATE

The choice of a discount rate can profoundly effect the type of project undertaken by a government agency. A project which seems to yield substantial benefits, when evaluated at a 3% rate, may well be extremely wasteful if the appropriate rate is 12%. At stake in the choice of a discount rate, is the allocation of resources between the private and public sectors of the economy. The discount rate, by indicating what government investments should be undertaken, can determine the proportion of the economy's activity to be operated by government agencies and the proportion to remain in the hands of private enterprise. The observation of discount rate being the arbitrator for allocation of resources between private and public enterprise, is the key to the principles which underlie the choice of an acceptable discount figure.[94]

Some authors have argued that the appropriate discount rate to use for government investment decisions depends upon the

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[94]Fisher, G. H., Cost Considerations in Systems Analysis, American Elsevier Publishing Company, Inc., 1971, p. 221.

problem of choice and risk of the alternative projects being considered. If leaving the resources within the private economy is a suitable alternative, then the discount rate would be roughly the same as for private enterprise. If the private economy is not a viable alternative, then perhaps, a different discount rate should be used.

Some investments are certainly more risky than others, particularly in the Defense Department. The private sector, in many instances, compensates for risk in investments by the use of higher discount rates. There are other means to express risk in an analysis, which involve the assignment of probabilities of future events, as reflected in future cash flows.

Advanced weapons systems appear to be among the most risky enterprises today, and are certainly more risky than a housing investment decision. Hitch and McKean, in their book, The Economics of Defense in the Nuclear Age, state that the appropriate discount rate during World War II appeared to be higher than 20%, because immediate results were so much more important than distant payoffs. Fortunately, public or military housing, is not in this situation today and the private rate of return or discount rate is perhaps most appropriate for use in present value analysis of military housing investment alternatives.

In OMB Circular A-104 issued by the President's Office of Management and Budget, concerning comparative cost analysis for decisions to lease or purchase real property, a 7% discount

rate is prescribed. This rate represents an estimate of the internal rate of return on general purpose real property leased from the private sector, exclusive of property tax and expected inflation. Real property, as defined by the circular, applies to the acquisition of buildings, warehouses, and associated land for which estimated land and construction costs, or market value, is $500,000 or more.[95] The circular further prescribes the present value of future projections of alternatives, over the relevant time period, to be the basis for determining the most economic choice. It further states that economic analyses should be estimated in constant dollars instead of current dollars.

Constant Year Dollars are associated with a base year. The base year is usually considered to be the year in which the investment is made or the alternative chosen. An estimate of a cost or benefit is said to be in constant dollars if all future costs and benefits are adjusted so that they reflect the level of prices for the base year. When prior or future costs are stated in constant dollars, the cost or benefit figures are adjusted to presume the buying power of the dollar was the same and will continue to remain the same as in the base year of the analysis.

Current Year Dollars are current to the year that costs are being incurred or benefits are being derived. When prior

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[95]Office of Management and Budget, OMB Circular, No. A-104, Comparative Cost Analysis for Decisions to Lease or Purchase General Purpose Real Property, 14 June 1972, p. 1.

costs or benefits are stated in current year dollars, the figures given are the actual amounts paid out or received. When future costs or benefits are stated in current year dollars, the figures given are the actual amounts which will be paid. This includes any inflationary, or deflationary, amounts due to future price changes. When making future estimates, it is necessary to initially assume a base buying power for each dollar (constant dollar) and then apply an inflation or deflation factor, which converts the estimate into current year dollars. In short, current dollars are inflated dollars.

The Defense Economic Analysis Council lists some advantages in the use of constant and current year dollars as follows:[96]

1. Constant Year Dollars

a. Constant year dollars remove distortions which are attributable only to price level changes.

b. Use of constant year dollars aids in the attempt to control inflation, since the expectation that inflation will continue adds substantially to inflationary pressures.

2. Current Year Dollars

a. The use of current year dollars compensates for the inflationary gap that occurs between the time a budget request is submitted and the time funds are actually expended.

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[96]Department of Defense, Economic Analysis Handbook, 2nd edition, 1971.

b. Current year dollars more realistically reflect likely expenditure levels, and reduce cost overruns, by showing more realistic estimates.

E. INFLATION AND THE DISCOUNT RATE

The Department of Defense is making increased use of current dollars which consider inflationary costs, in its internal planning process. DOD has published limited and sometimes conflicting policies concerning the use of inflation factors, in guidance provided for present value techniques of economic analysis. A basic policy requires that when inflation is considered important to the conclusion of the study, a second computation be made in terms of current (inflated) dollars. This is done only after the analysis is made using constant or uninflated dollars.[97] This policy does provide an element of consistency.

Another technique for handling inflation is the use of a joint discount/inflation rate in present value analysis. Since inflationary pressures reduce the buying power of a dollar in future years, the current value of the dollar is worth more today than tomorrow. A discount rate that also considers inflation must be altered to reflect the devaluation of the buying power of the constant dollar. A higher discount rate in a present value analysis reflects a higher valuation

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[97] DOD Instruction 7041.3, op. cit., p. 9.

of a dollar today, than a dollar tomorrow. Consequently, an inflation period would increase the discount rate and a deflationary period would decrease the discount rate. Specifically, inflation is included in the discount rate by applying a constant dollar price deflator. If the inflation rate of an economy is expected to be 2% over the life of an investment, then a discount rate of 7% would be increased to 9% and become a joint discount/inflation rate.

In conclusion, inflation can be considered in a present value analysis by three equitable methods. Future cash flows can be inflated by using current dollar costs and current dollar benefit figures, and then discounted to present value using the appropriate discount rate. Another technique is to discount future cash flows using constant dollars and discounting to present value using the appropriate discount rate. At the end of this analysis, an inflation factor can then be applied.

The last method uses base year constant dollars for future cash flows and then, discounting to present value by applying a joint discount/inflation rate. Regardless of the method used, the results of the calculations will be the same. A caution to be observed is the evidence of current dollar usage and a joint discount/inflation rate. This would amount to double counting inflation. In view of relative calculation ease, the authors have used constant dollars and a joint discount/inflation rate when considering inflation factors in present value analysis.

F. SELECTION OF DISCOUNT RATE FOR HOUSING INVESTMENT DECISIONS

The Department of Defense policy for adopting a discount rate to be used in present value economic analysis, considers private sector investment opportunities foregone.[98] This policy is based on the premise that no public investment should be taken without explicitly considering the alternative use of the funds which it absorbs or displaces.

The Department of Defense considers a 10% discount rate to be the most representative rate at present. Accordingly, future costs and benefits are required to be discounted at an annual rate of 10%. This rate is consistent with the Office of Management and Budget Circular No. A-94, which also prescribes a discount rate of 10% for non-general purpose real property.[99]

As cited previously, the Office of Management and Budget specifies a discount rate of 7% for general purpose real property. Department of Defense instructions also recognize this 7% discount rate for real property. For consistency reasons, they include a deflator rate of 3% and introduce a consideration for inflation. This adjustment in the discount rate transforms it into a 10% joint discount/inflation rate when applied to real property economic analysis.

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[98] Ibid., p. 6.

[99] Office of Management and Budget, IMB Circular No. A-94, Discount Rates to be Used in Evaluating Time-Distribution Costs and Benefits, 27 March 1972, p. 1.

G. ANALYTICAL TECHNIQUES

A number of methods for analyzing investment alternatives have been developed through the years. Generally, all analytical techniques may be classified in two broad categories: (1) those that recognize the time value of money and (2) those that do not. As noted earlier, money does have time value, and any analysis encompassing cash flows over extended periods of time must not ignore this fundamental fact. Only one method of analysis that does not consider the time value of money will be mentioned in this chapter. It is often used in private industry and government to express the results of an economic analysis to persons not familiar with economic analysis terminology. This method is called the "payback period."

The Payback Method is the expression of the length of time, in years, required for the net cash receipts (or cost avoidance) from an investment to equal, in total, the amount of the initial outlay of funds or investment. It is sometimes described as the time required for an investment to pay for itself. In government, the pay back period is a way of stating the number of years that future savings will match added investment costs.[100] The customary formula used to calculate the payback period is as follows:

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[100]Department of the Navy, Naval Facilities Engineering Command, NAVFAC P-442, Economic Analysis Handbook, May 1971, p. 4.

$$\text{PAYBACK PERIOD} = \frac{\text{Initial outlay or investment}}{\text{Average annual net cash receipts}} \text{ (years)}$$

Presumably, the shorter the payback period, the more desirable is the investment opportunity. As an example, if the payback period for a project A is 2 years and for a project B is 3 years, project A is preferable using payback period criterion.

The payback period method is often considered to be reliable when the net cash flows are highly uncertain. This is in keeping with the principle that the quicker the capital invested is recovered, the lower is the risk. The method is also useful when highly profitable alternatives are in abundance and there is a less pressing need to make a refined analysis.[101]

As noted above, one of the weaknesses of this method is that it ignores the time value of money. This method also ignores the cash flows occurring subsequent to the payback period and makes no explicit measure of the overall long term profitability of an alternative.

The payback period method is one of the required analysis used with the submission of an urgent minor construction project, ($50,000 to $300,000), within the Department of

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[101]Black, H. A., Champion, J. E. and Miller, G. U., Accounting in Business Decisions, third edition, Prentice-Hall, Inc., 1973, p. 668.

Defense. If the payback period is less than 3 years, a certificate of urgency is not required for the project submission.[102]

There are three analytic techniques under present value analysis which take into consideration the time value of money. Two of these techniques have various names, depending on the source of reference. For the purpose of consistency, the terms used within the Department of the Navy will be used almost exclusively.

1. Net Present Value

Net Present Value is the difference between the present value of the future cash receipts and the present value of future cash outlays that are directly traceable to the investment. If the net present value is positive, the investment is considered profitable, and conversely, the investment is unprofitable if the net present value is negative. In this method, all future cash flows (receipts and costs) are discounted to their present values by the interest rate or discount rate. The formula for the net present value is as follows:[103]

$$NPV = \sum_{n=1}^{N} \frac{(B_n - C_n)}{(1 + i)^n}$$

N = the economic life of alternative in number of years

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[102]United States Code, Title 10, Section 2674.

[103]Weston, J. F. and Brigham, E. F., Essentials of Managerial Finance, 3rd edition, Dryden Press, 1974, p. 219.

i = interest or discount rate (10% for Navy investments)
B_n= dollar value of Benefits in year n
C_n= dollar value of costs in year n
$\sum$ = the sum of the present values for the years of the economic life of the project

The quantity $\frac{1}{(1+i)^n}$ has been conveniently converted to present value discount factor tables. This simplifies the above formula to the following:

$$NPV = \sum_{n=1}^{N} (B_n - C_n) \text{ P.V.F.}$$

P. V. F. = present value interest factor from tables. Present value interest factors differ depending upon whether the cash flow each year is accumulated in a uniform flow throughout the year, or accumulated as a lump sum at the end of the year. The Navy used uniform cash flow factors throughout stated one-year periods. These factors are equivalent to an arithmetic average of beginning and end of the year compound amount factors found in standard present value tables.

When comparing the present value of future cash flows of two or more alternatives with the same economic life, the most profitable alternative is that alternative with the greatest present value. If the analysis involves only cost, assuming all benefits are equal and greater than cost, then the alternative with the lowest present value is the superior investment.

A simple example of a net present value analysis can be shown in the following sample problem, in which two investment projects are compared. A discount rate of 10% is used in this example:

PROJECT A

YEAR	NET CASH FLOW	PRESENT VALUE FACTOR	PRESENT VALUE
1	75	.954	$ 71.55
2	175	.867	151.73
3	50	.788	39.40
		TOTAL	$262.68

present value of net cash flow = $262.68
less initial investment costs = 200.00
Net present value $ 62.68

PROJECT B

YEAR	NET CASH FLOW	PRESENT VALUE FACTOR	PRESENT VALUE
1	100	.954	$ 95.40
2	100	.867	86.70
3	100	.788	78.80
		TOTAL	$ 260.90

present value of net cash flow = $260.90
less initial investment costs = 200.00
Net present value $ 60.90

In the above net present value analysis, project A is the superior investment, since it has the greater net present value.

The above example considers projects of equal economic lives or life-cycles. When comparing alternatives with

different economic lives, a different technique of the net present value concept can be used, which will be discussed later in this

2. Present Value Ratios

Present Value Index, Benefit/Cost Ratio, or Savings/Investment Ratio are ratios of the net present value of cash receipts or benefits to the net present value of cash outlays or costs:

$$\text{Present Value Index or Benefit Cost Ratio} = \frac{\text{Present Value of Benefits/Receipts}}{\text{Present Value of Costs/Outlays}}$$

Stated a different way, the Savings/Investment Ratio is shown below:

$$\text{Savings/Investment Ratio} = \frac{\text{Present Value of Savings}}{\text{Present Value of Investments}}$$

The Department of the Navy uses the term Savings/Investment Ratio (SIR) more often than the Benefit/Cost Ratio.

There is universal agreement that these ratios are useful in determining whether or not an independent investment is feasible. An independent investment analysis concerns only the question of a single investment being economically feasible and considers no other investment alternative. In this type analysis, if the ratio is greater than 1.0, the net present value of the investment is also positive, indicating the project is profitable.

Benefit to Cost Ratio or the SIR has been a common method of comparison for federal projects and other

multipurpose public activities.[104] There is, however, considerable disagreement concerning the use of these ratios as a method of ranking various investment alternatives. Fallacious ranking can occur depending on whether an item is classified as a cost or as a benefit. When using the SIR, the problem is in determining whether an item is classified as an investment cost or a cost against savings, which is just another way of expressing the preceding concept.

The ratio can be considerably influenced by this arbitrary decision.[105, 106] For example, consider an alternative that has $250,000 of benefits, $100,000 of costs, and an item of $90,000 that could be classified as a cost or disbenefit. In the case of the SIR, the question surfaced is whether the item should be considered an investment cost or a cost against savings. When the item is considered a cost, the ratio equates to the following:

$$B/C \text{ or } SIR = \frac{250,000}{100,000 + 90,000} = 1.32$$

If the item is considered a disbenefit or a cost against savings, the ratio is:

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[104] Riggs, J. L., Economic Decision Models for Engineers and Managers, McGraw-Hill Co., 1968, p. 246.

[105] Bierman, J. H., and Smidt, S., The Capital Budgeting Decision, 3rd edition, Macmillan Co., 1971, p. 47.

[106] Grant, E. L. and Ireson, W. G., Principles of Engineering Economy, 5th edition, Ronald Press Co., 1970, p. 143.

$$\text{B/C or SIR} = \frac{250{,}000 - 90{,}000}{100{,}000} = 1.60$$

Using the same data, but interpreting a negative cost item so that in one instance it is placed in the numerator of the ratio and in another instance it is placed in the denominator, leads to different ratio outcomes. When comparing two alternatives, the decision to place this negative cost item in the numerator will often give one alternative a higher ratio. When the item is classified in the denominator, the ranking of the alternative may become reversed.

The ratio is most accurate and useful when all of the cash flows, with the same timing, can be legitimately combined. This requires an analysis of all the cash flows within a given year.

A net present value determination is then made for all the net benefits or net savings and that figure is placed in the numerator. A similar determination is made for the costs or investment outlays for the project and finally the ratio is calculated.

It should be noted that a decision to classify a negative cost item as a cost or disbenefit as in the case of the benefit to cost ratio, or as an investment cost or a cost against savings in the SIR, has no effect on the outcome of a net present value analysis.

3. Internal Rate of Return

Other common terms used synonymously for the internal rate of return are rate of return, yield, effective yield, discounted rate of return, return on investment, present value return on investment and marginal efficiency of capital.[107] The Department of the Navy uses the term internal rate of return (IRR).

The internal rate of return is a useful method to use in ranking alternatives or projects, but can be burdensome to compute. The procedure for computing the IRR is essentially the same as that used for the net present value. The task is to find a rate of interest that will make the present value of the cash benefits expected from the investment, equal to the present value of the costs required by the investment alternative. In other words, it is the rate of interest or discount which will equate the present value of the net benefits of a project to the costs.[108] Such a rate of interest is usually found only by trial and error, hence, it is often a long and cumbersome procedure.

The IRR method is especially useful in businesses where the internal rate of return may be compared with the firm's cost of capital to determine if an investment alternative

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[107] Bierman and Smidt, op. cit., p. 26.

[108] Quirin, G. D., The Capital Expenditure Decision, Irwin Inc., 1967, p. 41.

is profitable. If the interest rate determined from the IRR method is greater than the firm's cost of capital, then the investment is considered economically desirable.

The IRR method is often discussed and used in the private sector, but it is not often used or suggested as a method for use in evaluating government investments.

It should be noted that all of the above present value techniques take into consideration the time value of money and also consider the life-cycle costs or economic life of an investment alternative. They are examples of life-cycle benefit-cost analysis. This term is shortened to life-cycle cost analysis, when assuming equal benefits between all alternatives or when considering costs only.

Benefits in the public sector are often difficult to define, not withstanding the often more difficult task of placing a dollar measure or other effectiveness measure on them. This aspect is discussed in Chapter IV.

In government and in defense, alternatives being considered to achieve a given mission or objective may have the same level of benefits. In this situation, the alternative with the lowest net present value or discounted cost is the alternative that is chosen. The analysis then becomes a ranking of alternatives in accordance with their present value life-cycle costs.

In conclusion, when ranking investment alternatives with the same economic lives, the net present value method

appears to be the easiest to understand, less risky to calculate, and the simplest to use.

H. COMPARING HOUSING INVESTMENT ALTERNATIVES WITH DIFFERENT ECONOMIC LIVES

Many projects within the Department of Defense are designed with a specific economic life in mind. When comparing alternatives, the problem is determining costs and benefits of each alternative and then, comparing the net present value of each alternative. If equal benefits are assumed for each alternative, then the alternative with the least net present value cost is selected. When such alternatives have different lives, this comparison becomes more difficult, because the net present value alternative with the longest life, will accumulate more costs, because of its longer life. What is required is a method of comparison that achieves a common time horizon for each alternative.

Three methods are discussed in addressing this problem: (1) replacement chains, (2) salvage value at end of shortest life, and (3) equivalent or uniform annual costs.[109]

Replacement Chains: This method achieves a common time horizon by assuming that each alternative can be replaced at the end of its economic life by an identical system. The sequential replacement of each respective system alternative is continued until the lowest common multiple of lives is

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[109]Fremgen, op. cit., p. 420-422.

equal for all alternatives. For the high technology investment, such as an advanced weapons system, it presumes technology will stagnate over the time frame of the analysis.

Salvage Value at End of Shortest Life: This method chooses the alternative with the shortest economic life for comparing all alternatives. An estimated salvage value of the longer lived alternative is determined for that year in which the life of the shortest lived alternative ends. This places all alternatives on a common time horizon. This method of analysis depends upon a reasonable estimate of the salvage value for the longer lived alternative. If this salvage value is highly suspect, the approach becomes very unsatisfactory.

Equivalent Annual Costs or Uniform Annual Costs: This technique for comparing alternatives of different economic lives requires the computation of effective annual cost, equivalent to the present value of the total cost of each alternative. Theoretically, if a project could be paid off in equal annual installments, the uniform annual cost would be the amount paid each year. The total present value of these installments would be equal to the total present value computed from the estimated life-cycle costs. The same analogy could be drawn for benefits, if they were to be computed on a uniform annual benefit basis.

The Department of Defense and the Navy use the term uniform annual cost and require its use when comparing alternatives

of different economic lives.[110] It is calculated by dividing the total present value cost by the sum of the present value factors of the years in which the alternative yields benefits:

$$\text{uniform annual cost} = \frac{\text{net present value costs}}{\text{sum of present value factors}}$$

This computation assumed equal benefits among alternatives and gives the average cost per year for the life-cycle of the investment alternative. The alternative with the lowest average annual cost is considered to be the superior investment. If the benefits are unequal among alternatives, then the numerator is changed to reflect a net present value of the net positive and negative cash flows that occur in each year of the economic life of an alternative.

Of the three techniques discussed here, the uniform annual cost is the simplest and as valid as either of the other two. It avoids the task of estimating a salvage value as in the second method above, and will give the same results as the replacement chain method.

As applied to housing, the alternatives available to the housing manager, in determining what to do with marginally adequate quarters, have varying economic lives. Of the methods discussed above, the uniform annual cost present value analysis technique is used to compare these alternatives, consistent

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[110] SECNAVINST 7000.14A, op. cit., p. 7.

with the Department of Defense and the Department of the Navy policies.

As a practical example, Figure 13 is a comparison of two projects with different economic lives, using the present value analysis technique of uniform annual costs. A discount rate of 10% is used in the analysis.

The Department of the Navy and DOD recognize the uniform annual cost method of analysis for comparing alternatives with different life-cycles; therefore, this economic analysis technique has been used to analyze the alternatives available to the Navy housing manager in managing his marginally adequate housing assets.

I. SUMMARY

When comparing investment alternatives, life-cycle costs and benefits must be considered in order to effect the most efficient resource allocation. Since money has a time value associated with its use, future cash flows are adjusted to measure its value in the present time through the process of discounting. Discounting is accomplished through the use of an appropriate interest or discount rate. The discount rate used in DOD and in the Department of the Navy is 10% and measures the investment opportunities foregone in the private sector, and is the arbitrator for the allocation of resources between private and public enterprise.

The two basic types of economic analysis techniques are those methods that consider the time value of money and those

FIGURE 13

COMPARISON OF UNIFORM ANNUAL COSTS FOR TWO PROJECTS HAVING DISSIMILAR ECONOMIC LIVES

PROJECT A

PROJECT YEAR	PRESENT VALUE FACTOR	YEARLY COST	PRESENT VALUE
1	.954	300,000	286,200
2	.867	100,000	86,700
3	.788	50,000	39,400
4	.717	50,000	35,850
5	.652	50,000	32,600
6	.592	50,000	29,600
7	.538	50,000	26,900
8	.489	50,000	24,450
		$700,000	$561,700

$$\text{Uniform Annual Cost} = \frac{561,700}{(.954+.867+.788+.717+.652+.592+.538+.489)}$$

$$= \$100,357$$

PROJECT B

PROJECT YEAR	PRESENT VALUE FACTOR	YEARLY COST	PRESENT VALUE
1	.954	200,000	190,800
2	.867	75,000	65,025
3	.788	75,000	59,100
4	.717	75,000	53,275
5	.652	75,000	48,900
		$500,000	$417,100

$$\text{Uniform Annual Cost} = \frac{417,100}{(.954+.867+.788+.717+.652)}$$

$$= \$107,555$$

Conclusion: Project A is the superior investment, in this example, as it has a lower uniform annual cost ($100,357 vs $107,555).

which do not. An analysis of alternatives that have future cash flows is deficient, if it does not consider the time value of money.

A frequently used analysis technique that does not consider the time value of money is the payback period. Methods that do consider the time value of money are:

1. Net present value
2. Savings/investment ratio or benefit/cost ratio
3. Internal rate of return

When comparing alternatives with differing economic lives, three techniques of economic analysis that are frequently used are the following:

1. Replacement chains
2. Salvage value at end of shortest life
3. Uniform annual cost

APPENDIX B

SAMPLE FAMILY HOUSING O&M MANAGEMENT REPORT

FAMILY HOUSING OPERATION AND MAINTENANCE MANAGEMENT REPORT
ACTIVITY REPORT BY CATEGORY OF HOUSING

74FEB07

FACSO RPT SYM/NO 7300/B9850R01

PAGE 2

1. REPORTING ORGANIZATION - NAVY
2. PERIOD ENDING - 31 DEC 73
HMC - LANTDIV
7. INSTALLATION - 00129 NEW LONDON CT NSB
8. QUARTERS IDENTIFICATION
9. SPECIAL COMMAND POSITION -
3. HOUSING CATEGORY - A WHERRY
4. GEOGRAPHIC AREA - CONUS
5. FLOOR AREA (000 SQ FT) 472
6. AVG NO OF UNITS - 400

10. LINE ITEMS	CIV MANYRS A	LABOR COSTS B	OVRHD COSTS C	OTHER FUNDED COSTS D	TOTAL FUNDED COSTS E	MILITARY MANYRS F	MILIT COSTS G	TOTAL COSTS H	UNIT OF MEASUREMENT I	NO OF UNITS J	AVER FAMILY UNIT K	COST SQFT (000) L	PER UMEAS M
B.MAINT REAL P													
10.M&R DWELLI													
A)SERVICE C	.9	9935		240	10175			10175	# SER CALL	1250	25.44	21.56	8.14
B)ROUTINE M	2.3	22659		12801	35460			35460	F AREA 000	472	88.65	75.13	75.13
C)MIN REP/R				9557	9557			9557	#FH UN REP		23.89	20.25	
D)MAJ REP/R									#FH UN REP				
E)PAINT EXT									#FH UN PAI				
F)PAINT INT				10956	10956			10956	#FH UN PAI	110	27.39	23.21	99.60
11.M&R EXT UT		267		16293	16560			16560	#AV#FH UNI	400	41.40	35.08	41.40
12.M&R OTH PR													
A)GROUNDS		288		4571	4859			4859	# ACRES		12.15	10.29	121.48
B)SURFACE	.1	783			783			783	SQUARE YDS		1.96	1.66	
C)OTH PROPE	.1	676			676			676			1.69	1.43	
13.ALTER & AD		98			98			98	AV#FH UNIT	400	.25	.21	.25
14.TOT MAINT	3.4	34706		54418	89124			89124			222.81	188.82	
15.TOT O&M CO	5.1	52473		132663	185136			185136			462.84	392.24	

FAMILY HOUSING OPERATION AND MAINTENANCE MANAGEMENT REPORT
ACTIVITY REPORT BY CATEGORY OF HOUSING

74FEB07

FACSO RPT SYM/NO 7300/B9850R01

PAGE 3

1. REPORTING ORGANIZATION - NAVY
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A.OPERATIONS													
1.MANAGEMENT													
A)HOUSING O				20	20			20	AV#FH UNIT	400	.05	.04	.05
B)ADMIN SUP									AV#FH UNIT				
C)HOUSING R									TOT FAM HO				
D)PROG & ST									AV#FH UNIT				
2.SERVICES													
A)REFUSE CO	.2	2389		799	3188			3188	AV#FH UN S	400	7.97	6.75	7.97
B)FIRE PROT									AV#FH PROT				
C)POLICE PR									AV#FH UN P				
D)ENTOMO SR	.1	749			749			749	AV#FH UNIT	400	1.87	1.59	1.87
E)CUSTOD SR				701	701			701	AV#FH UNIT	400	1.75	1.49	1.75
F)SNOW REMO									AV#FH UNIT				
G)STREET CL	.1	1019			1019			1019	AV#FH UNIT	400	2.55	2.16	2.55
H)MUNIC SRV									AV#FH UNIT				
I)OTHER									AV#FH UNIT				
3.UTILITIES													
A)ELECTRICI				25012	25012			25012	THOU KWH	1803	62.53	52.99	13.87
B)GAS				2145	2145			2145	MILL BTU	2	5.36	4.54	1072.50
C)FUEL OIL				39987	39987			39987	THOU GAL	139	99.97	84.72	287.68
D)WATER				2838	2838			2838	THOU GAL	19200	7.10	6.01	.15
E)SEWAGE	.3	2591		2379	4970			4970	THOU GAL	1344	12.43	10.53	3.70
F)OTHER UTI	.9	9583		4015	13598			13598			34.00	28.81	
4.FURNISHING													
A)CONTROL M		398			398			398	RPL $000		1.00	.84	
B)M&R FURN									RPL $000				
C)REPL FURN									RPL $000				
D)INIT ISS									UN OUTFIT				
E)M&R EQUIP	.1	1038		349	1387			1387	RPL $000	93	3.47	2.94	14.91
F)REPL EQUI									RPL $000				
G)INIT ISS									UN OUTFIT				
5.LEASE&PERM									#FH UN LSE				
6.GERMAN TAX									#FH UN TAX				
7.U.K. ACC C									#FH UN CHA				
8.OTHER													
9.TOT OPER C	1.7	17767		78245	96012			96012			240.03	203.42	

APPENDIX C

HMC HOUSING QUESTIONNAIRE

The authors of this questionnaire are Civil Engineer Corps Officers and students of the Naval Postgraduate School, Monterey, California. We are working on a thesis research project exploring the options or alternatives open to the housing manager in deciding what to do with his marginally adequate housing units. This questionnaire concerns only two phases of the alternatives being considered. Your reply to the questionnaire is requested by 30 September 1974. Please mail your reply to LCDR C. D. Greene, 1296 Spruance Road, Monterey, California 93940, or to LCDR E. T. Taylor, 1277 Spruance Road, Monterey, California 93940, or call Autovon 479-2656 after 1330 PDT.

I. PERFORM IMPROVEMENT PROJECT. A stated secondary benefit derived from an improvement project is the reduction of operation and maintenance costs. With a $15,000 per unit limitation on improvement project cost and the lower O&M costs associated with newer construction as compared with older units (i.e., Wherry) reflected in the Family Housing O&M Management Report, what change in O&M levels would you estimate to be realized after completion of an improvement project on a group of marginally adequate quarters?

(Check One)

O&M costs "remain the same." ___

O&M costs decrease to same as "new construction." ____

O&M costs run somewhere between "remain the same" and "new construction." ____

(Circle One)

New Construction. Remain Same.

1 2 3 4 5 6 7 8 9 10

ADDITIONAL COMMENTS:

II. PERFORM NO IMPROVEMENT PROJECT. Assume a 20 year remaining economic life with the completion of an improvement project on a marginally adequate group of Wherry quarters. If you did not perform this improvement project do you feel there would be a decrease in the stated remaining economic life of the housing assets? ____ Yes ____ No

If yes, how many years do you feel the life of this housing asset would be reduced? ____ Years.

Do you feel this reduction in useful life would be caused mainly by future changes in habitability criteria or by a degeneration of the housing unit by virtue of age?

(Choose One)

Mostly increased habitability _____

Mostly degeneration of quarters _____

Both equally _____

ADDITIONAL COMMENTS:

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